

1/71



CLASS	O.G. FIG.
BY	CLASS/SUBCL.
CRAFTSMAN	

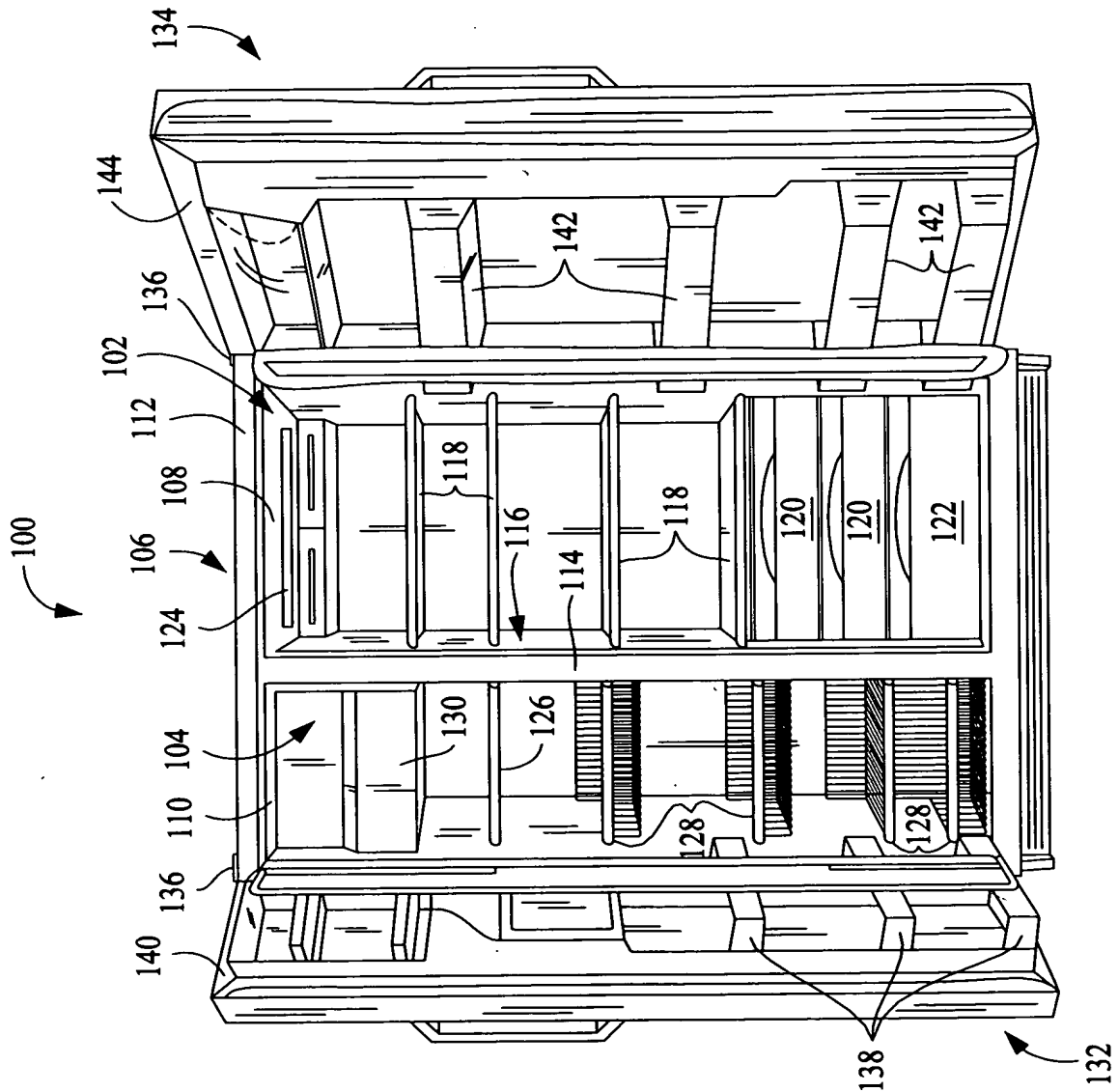


FIG. 1

THE REFRIGERATOR SYSTEM AND SOFTWARE
ARCHITECTURE

John S. Beulick, Armstrong Teasdale LLP, One Metropolitan Square,
Suite 2600, St. Louis, MO 63102 (314) 621-5070

2/71

102

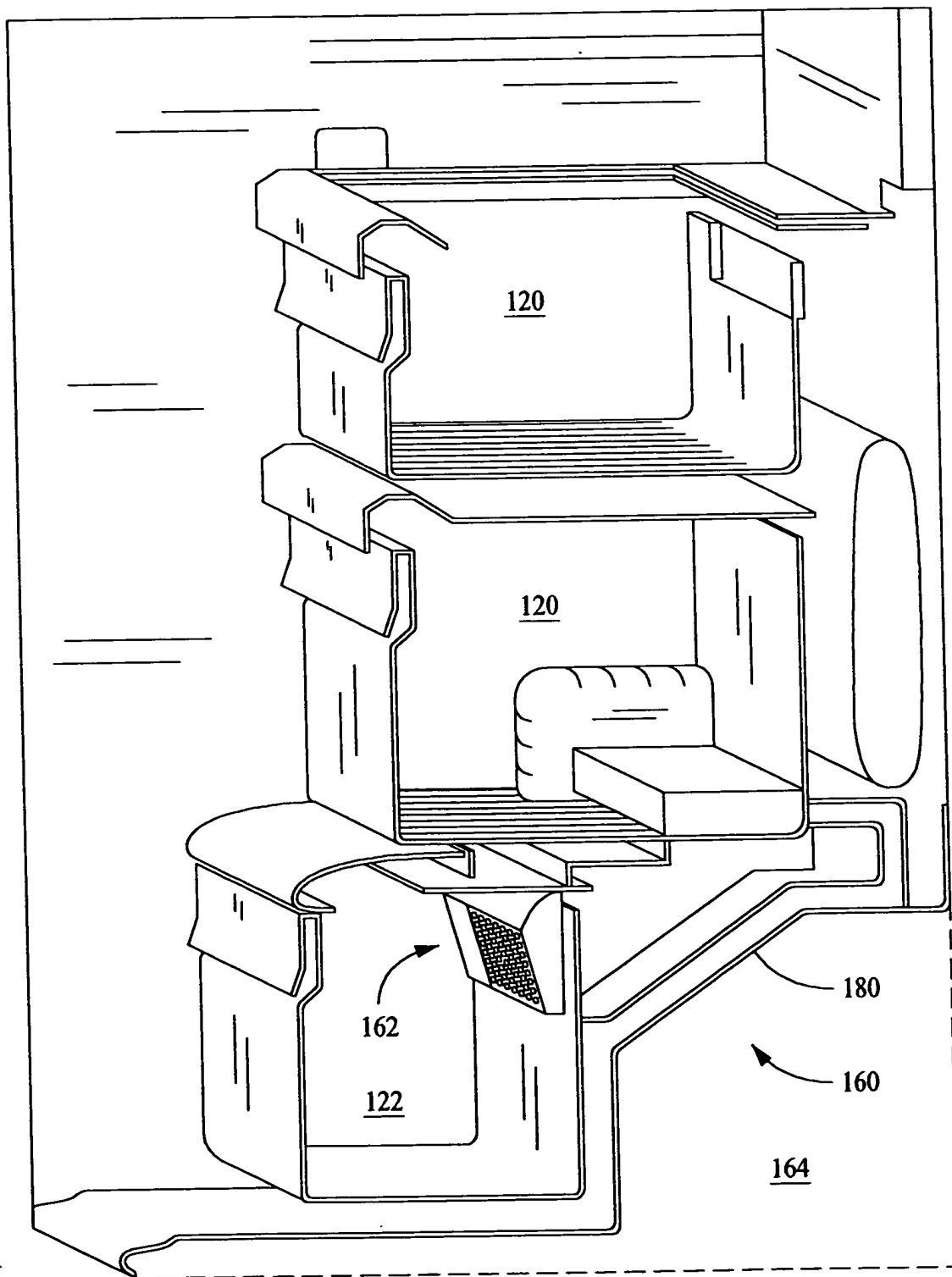


FIG. 2

Title: REFRIGERATOR SYSTEM AND SOFTWARE
ARCHITECTURE

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Suite 2600, St. Louis, MO 63102 (314) 621-5070

APPROVED	O.G. FIG.
BY	CLASS/SUBCL.
DRAFTSMAN	

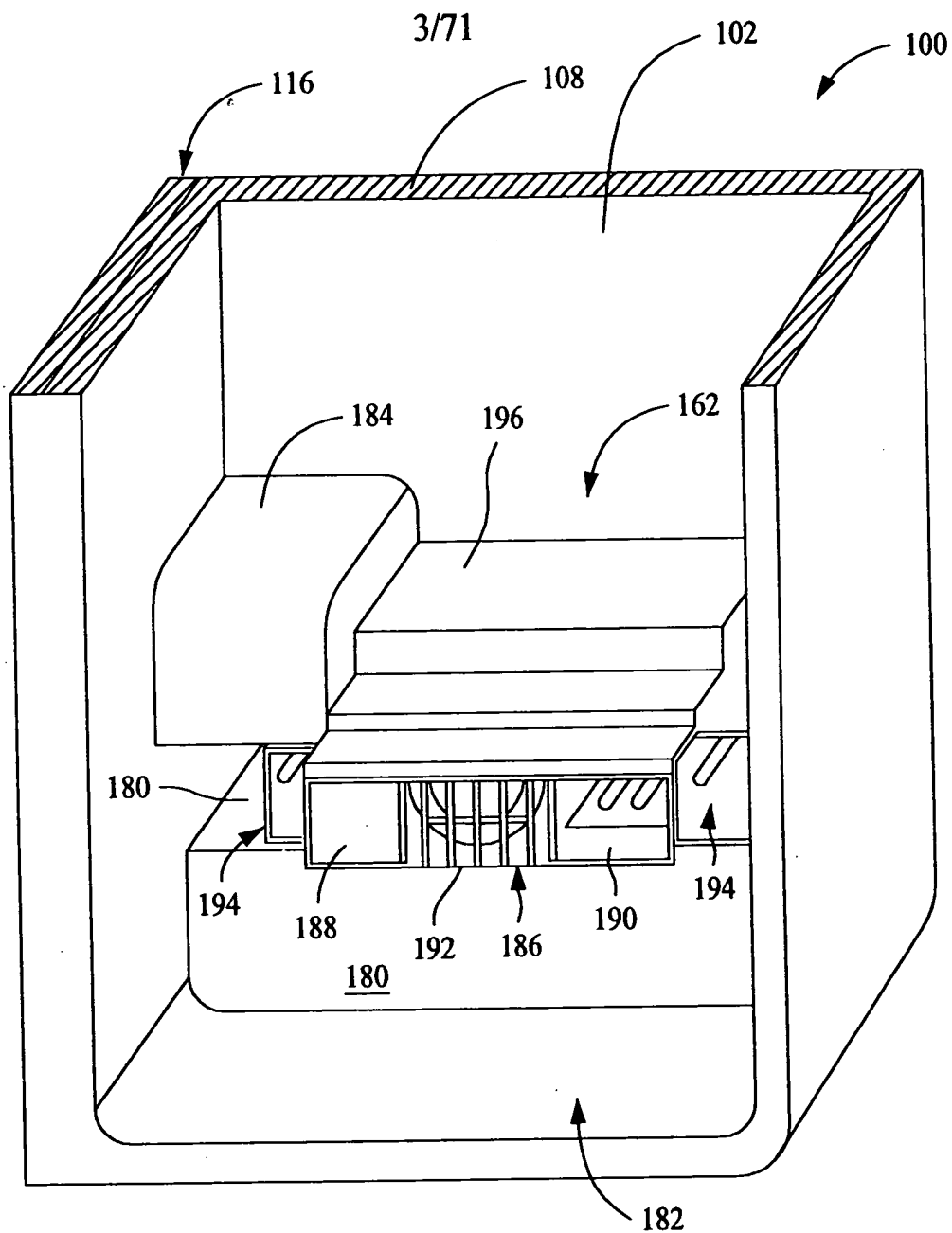


FIG. 3

Title: REFRIGERATOR SYSTEM AND SOFTWARE
ARCHITECTURE

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Suite 2600, St. Louis, MO 63102 (314) 621-5070

4/71

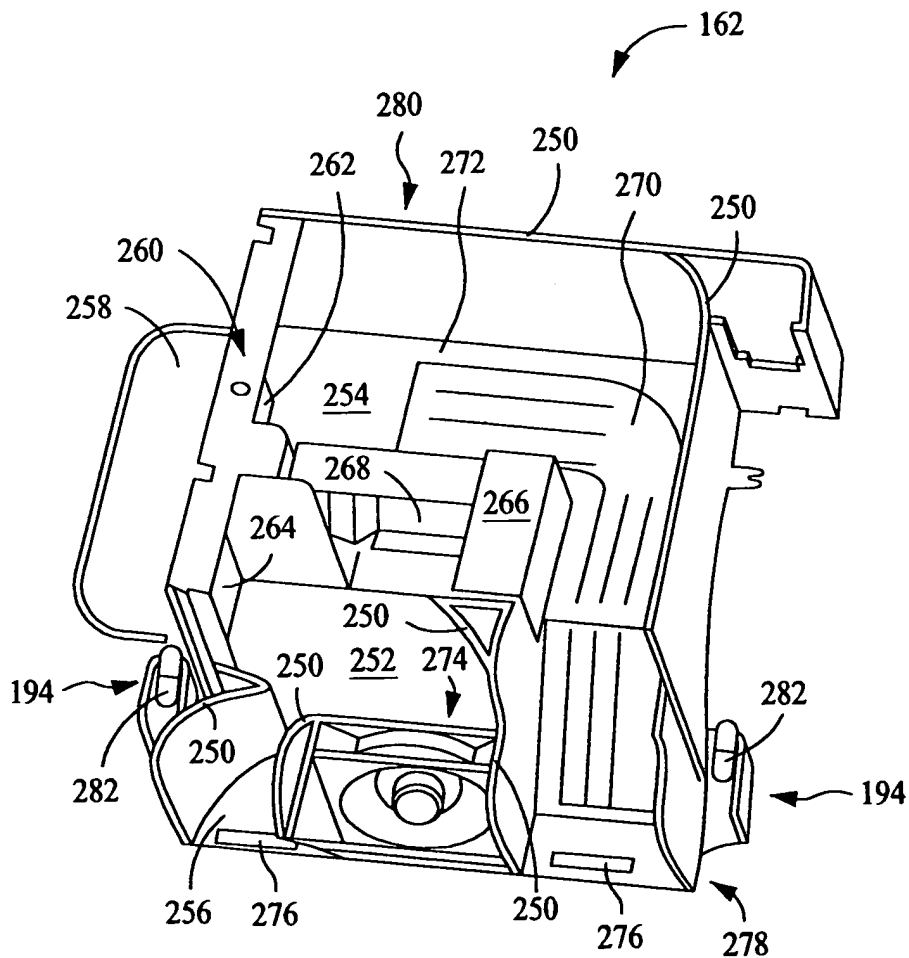


FIG. 4

ARCHITECTURE

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Suite 2600, St. Louis, MO 63102 (314) 621-5070

5/71

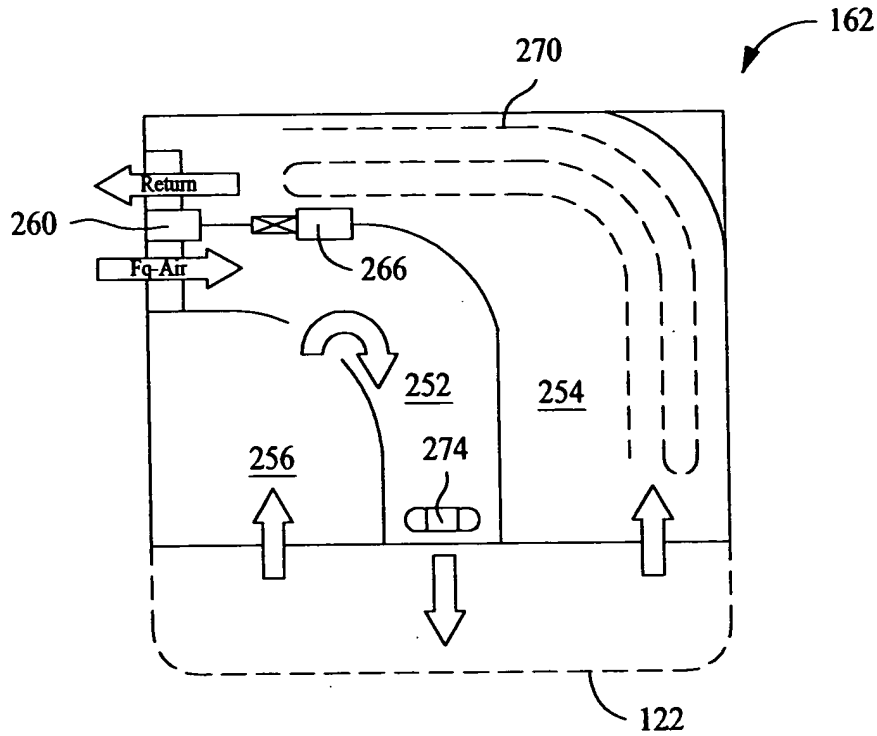


FIG. 5

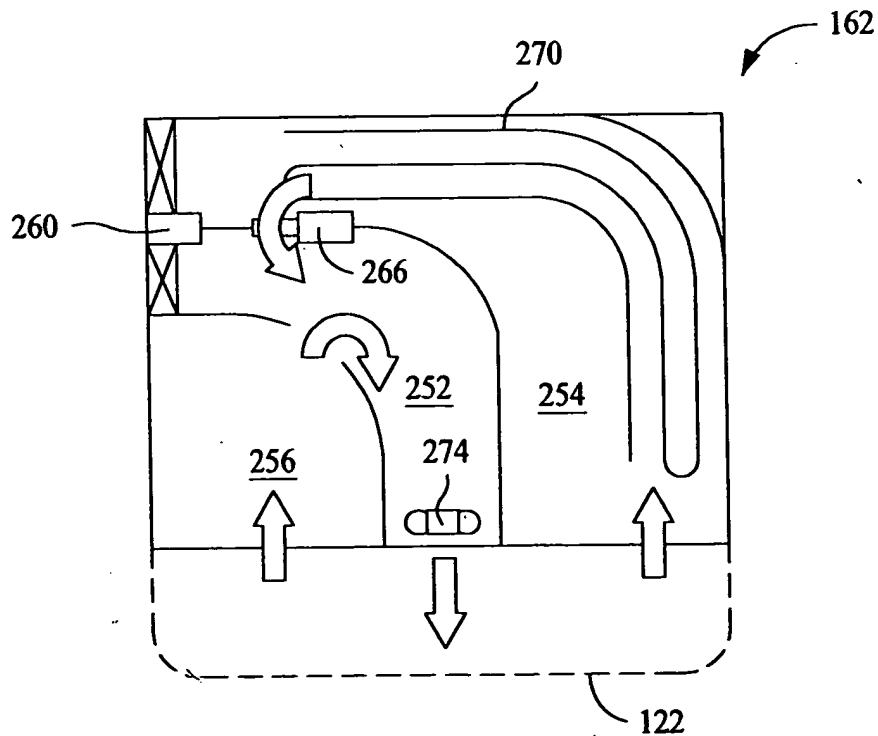


FIG. 6

Title: REFRIGERATOR SYSTEM AND SOFTWARE
ARCHITECTURE

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Suite 2600, St. Louis, MO 63102 (314) 621-5070

6/71

APPROVED	D.G. FIG.
BY	CLASS SUBC.
CRAFTSMAN	

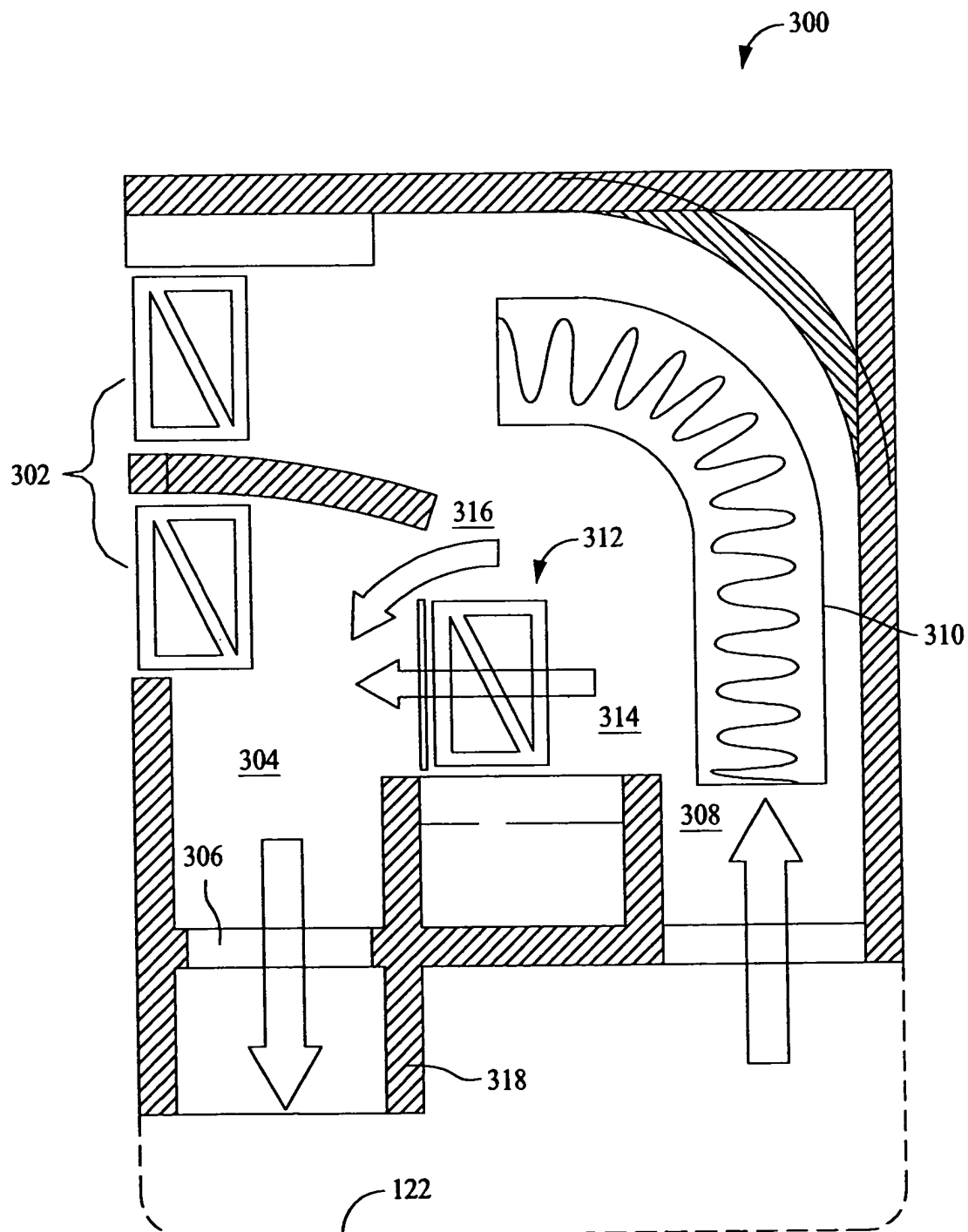


FIG. 7



7/71

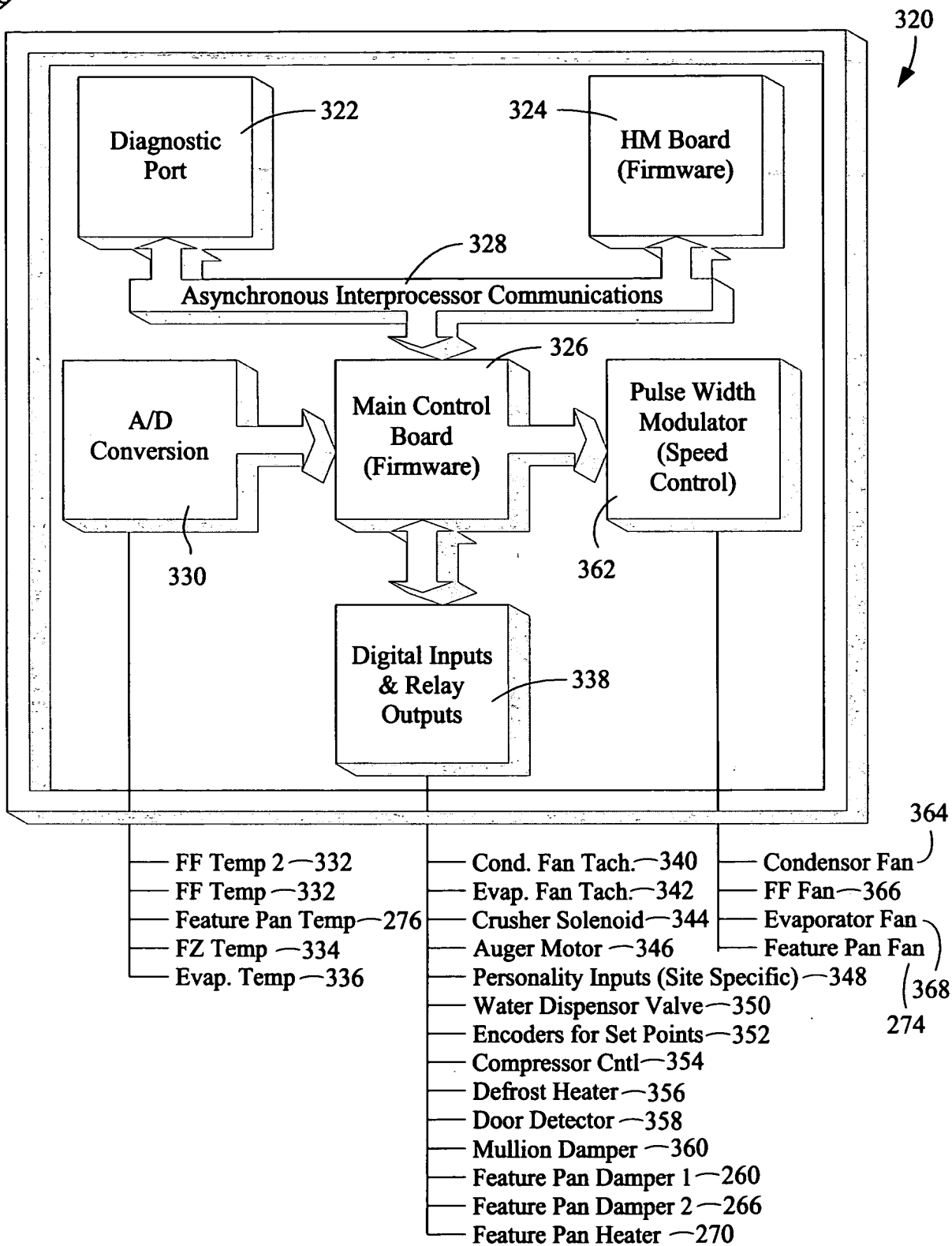


FIG. 8



O.G. FIG.
 CLASS SUBCL.
 BY
 DRAFTSMAN

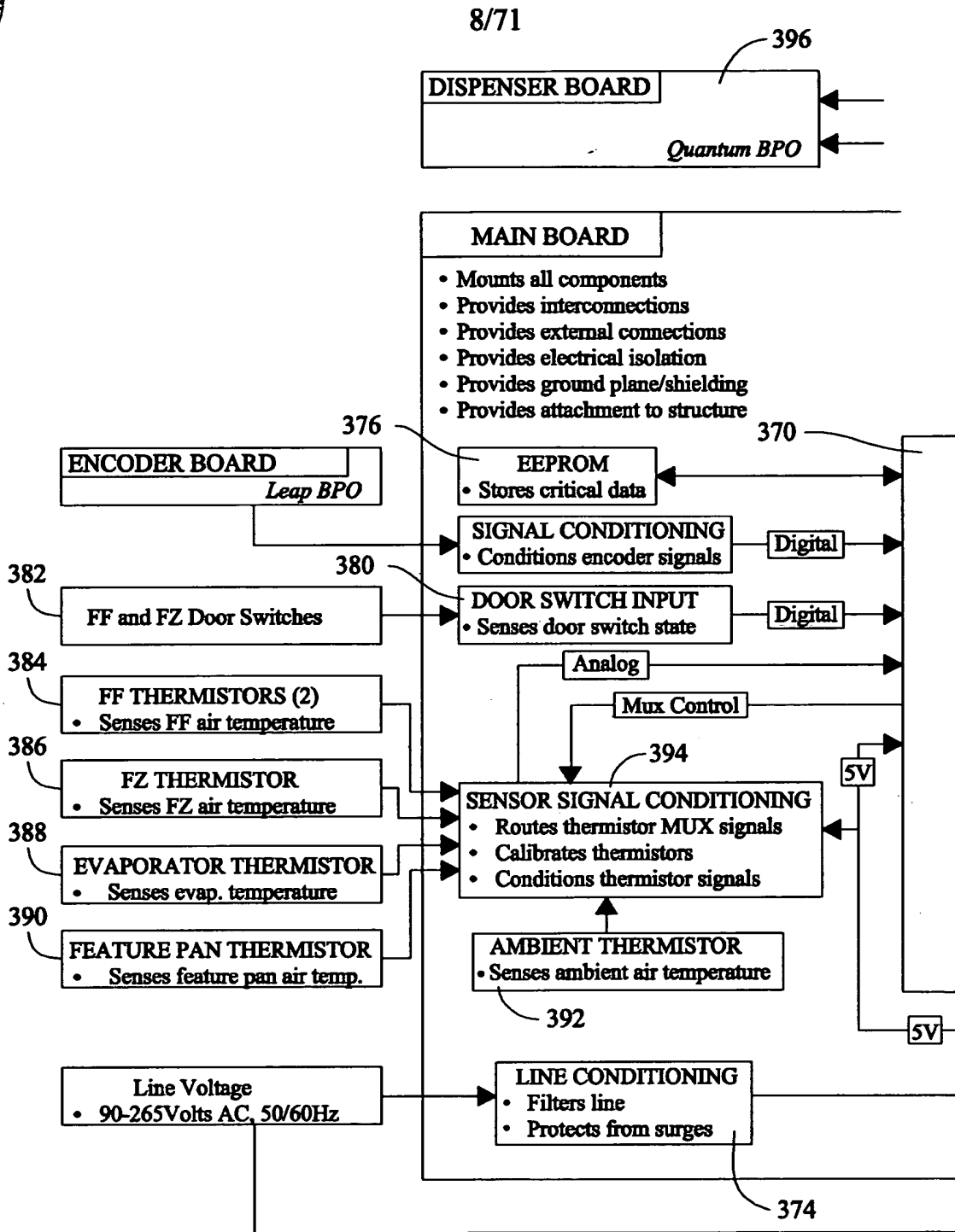


FIG. 9A

TO
FIG 9B



9/71

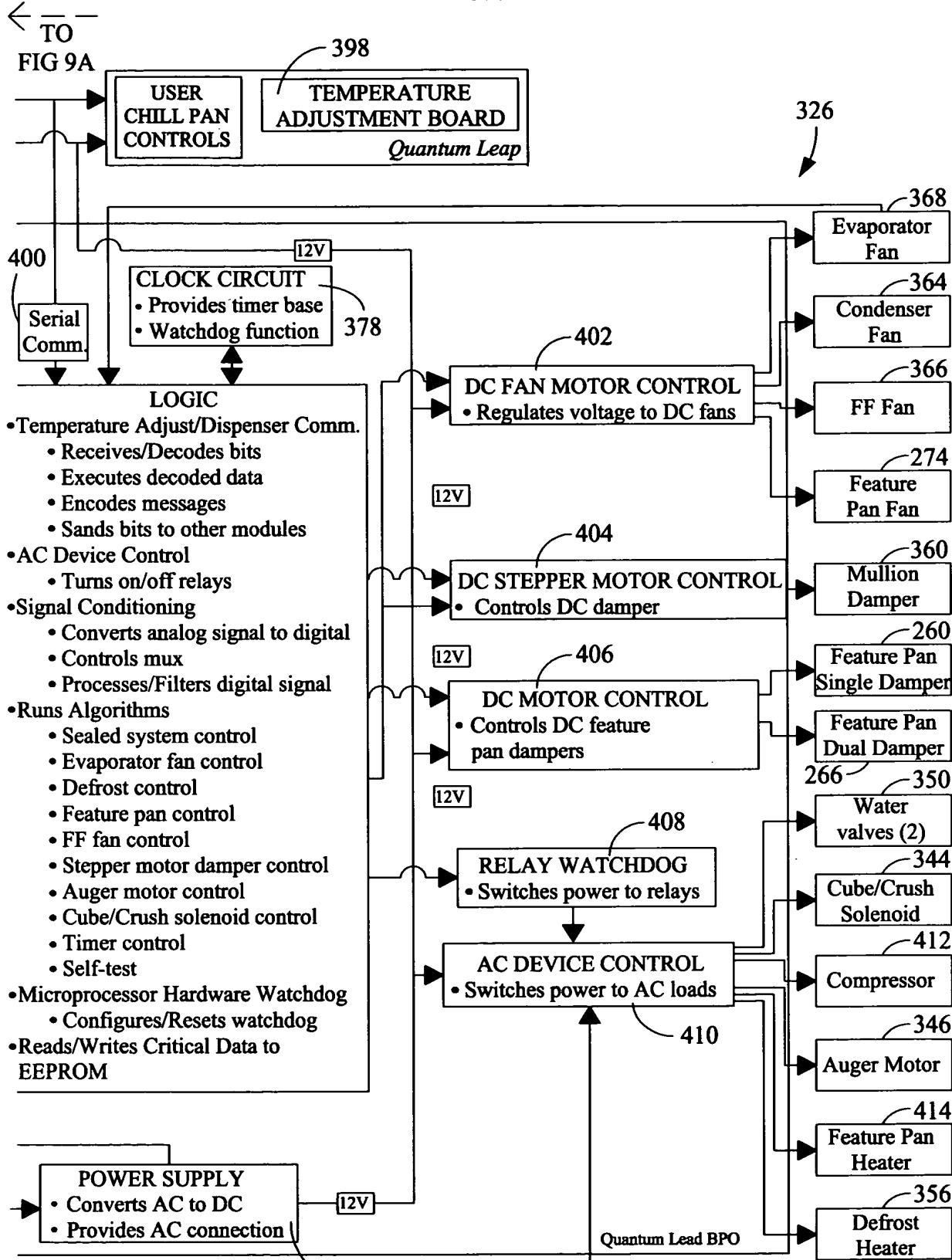


FIG. 9B

10/71



APPROVED BY CLASSIFIED BY CRAFTSMAN

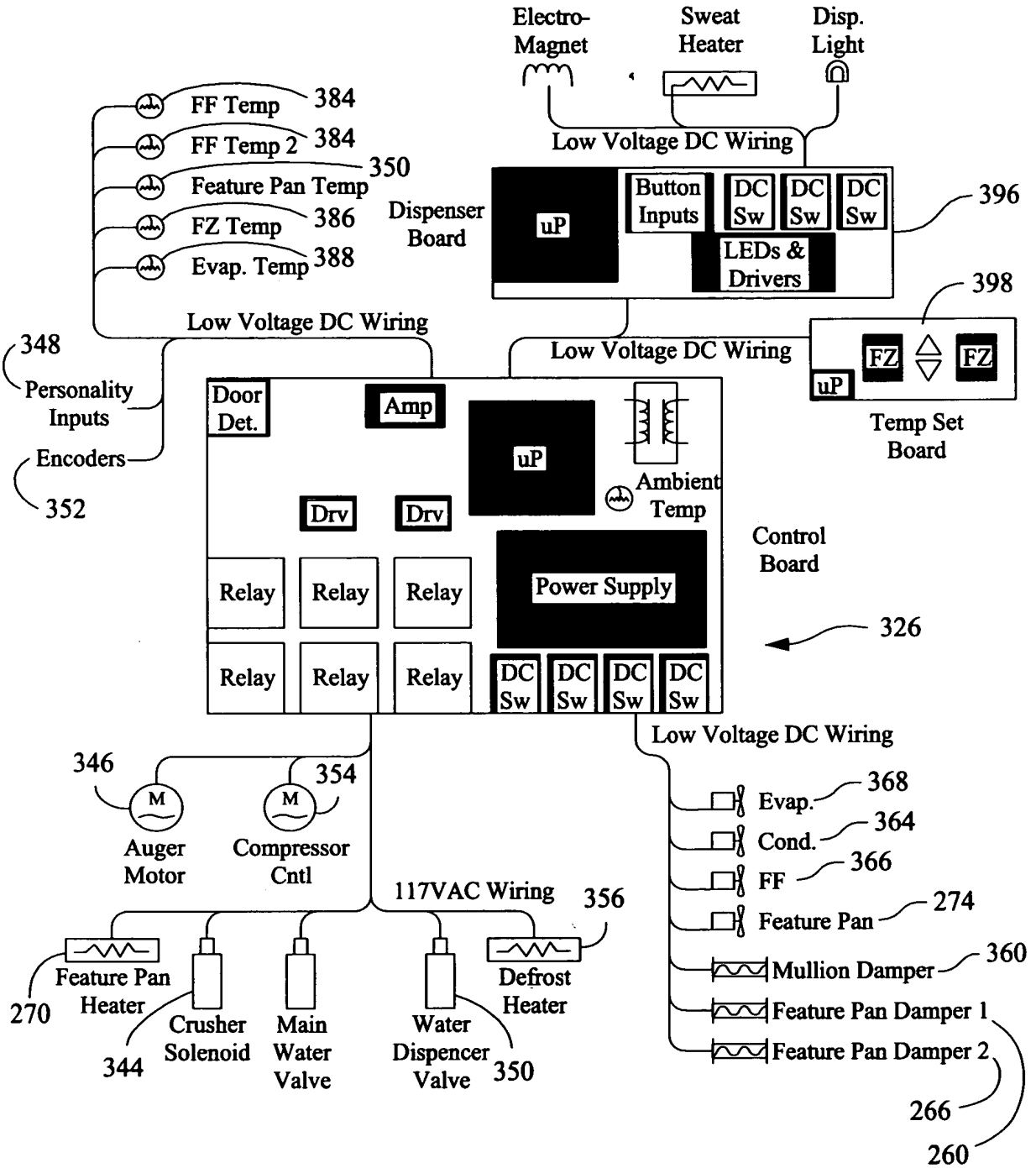


FIG. 10

Title: REFRIGERATOR SYSTEM AND SOFTWARE
ARCHITECTURE

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Suite 2600, St. Louis, MO 63102 (314) 621-5070

REVISED	O.G. FIG.
BY	CLASS/SUBCL
DATE	DRAFTSMAN

11/71

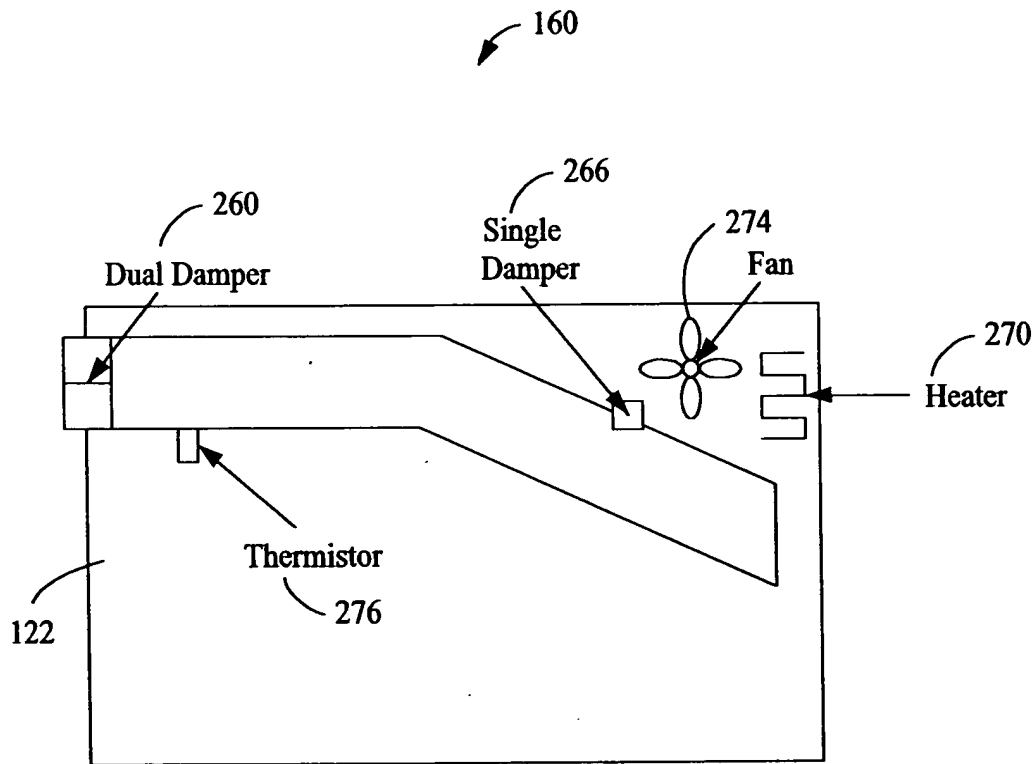


FIG. 11

Title: REFRIGERATOR SYSTEM AND SOFTWARE
ARCHITECTURE

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Suite 2600, St. Louis, MO 63102 (314) 621-5070

12/71

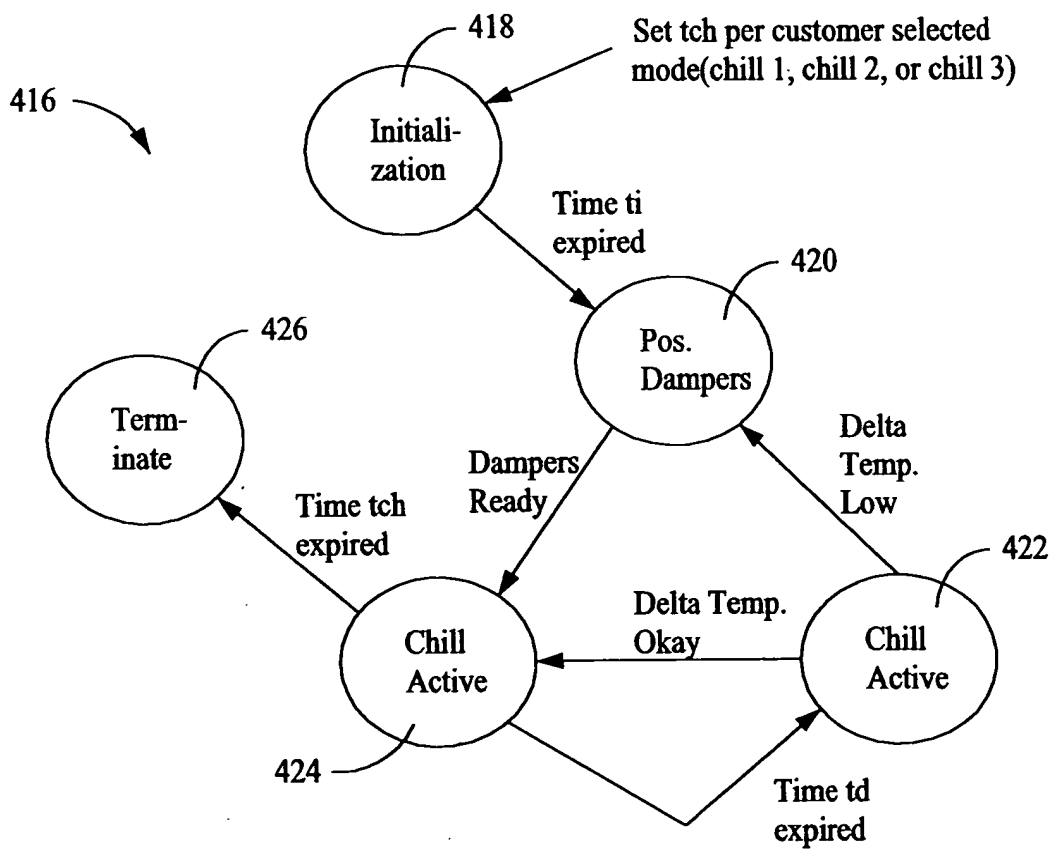
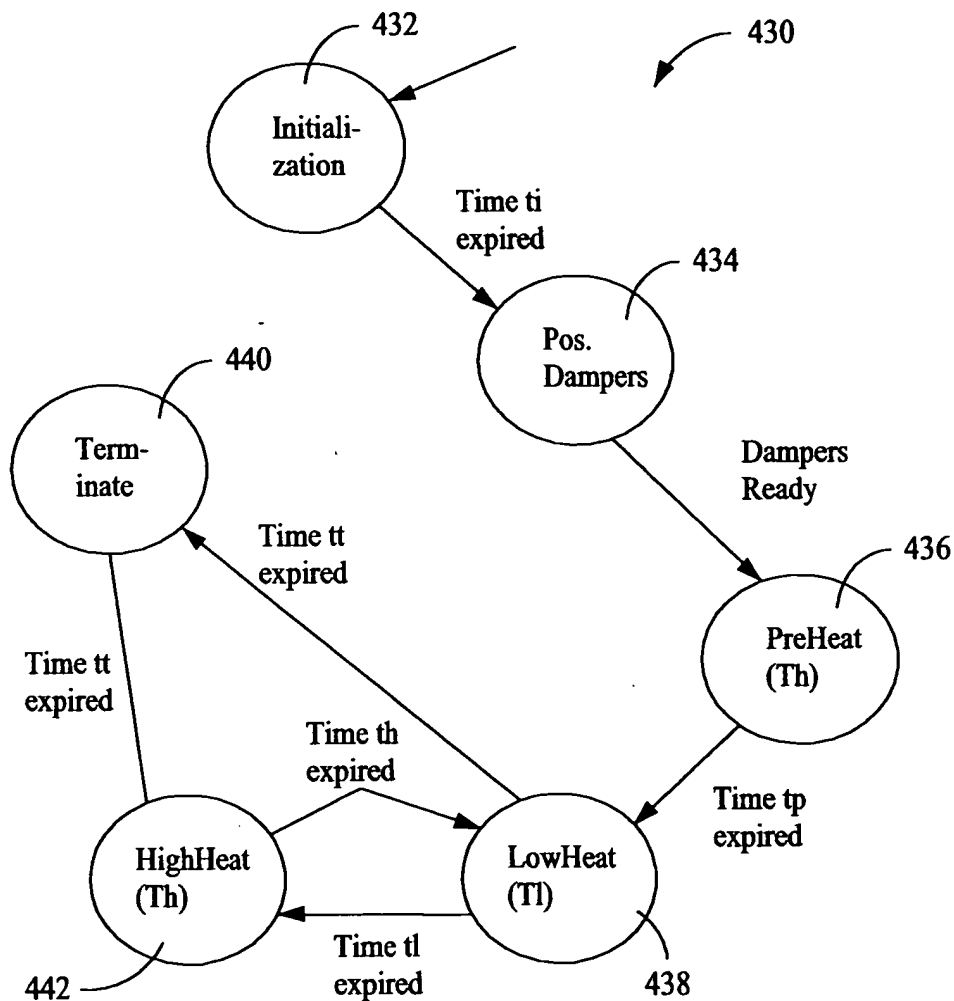


FIG. 12

13/71



Initialization: Shuts off heater and turns on fan. This mode is implemented so that the customer interface LED that is wired in parallel with the fan will turn on as soon as the button is hit. Time t_i is the initialization time and will typically be approximately one minute.

Pos. Dampers: This state shuts off the fan, sets the single damper open then closes the dual damper. It then turns the fan back on. This is done for power management

PreHeat: This state regulates the pan temperature

LowHeat

HighHeat:

Terminate: This mode closes both dampers and shuts off the fan then returns to idle.

FIG. 13

14/71

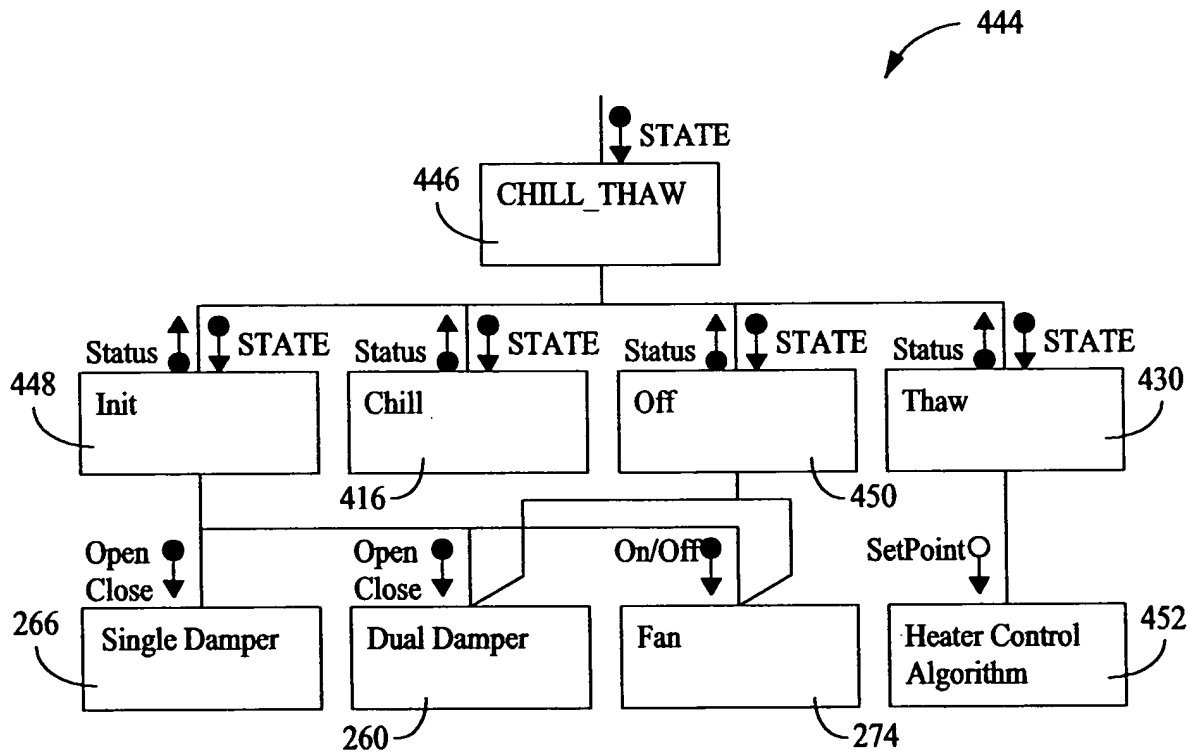


FIG. 14

15/71



APPROVED	O.G. FIG.
BY	CLASS SUBC.
CRAFTSMAN	

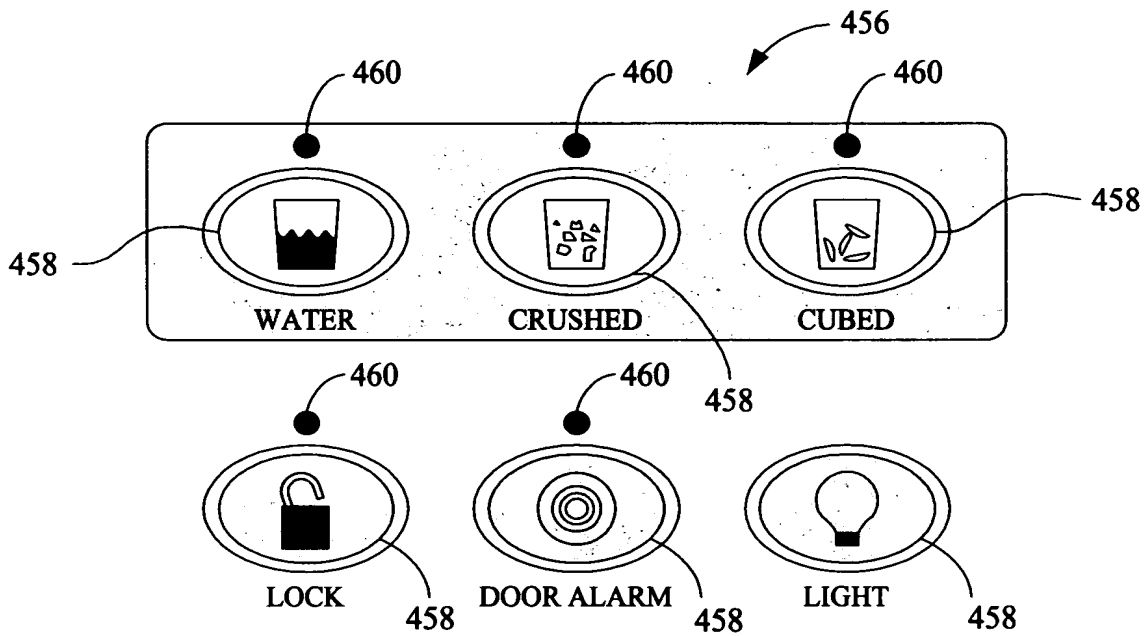


FIG. 15



APPROVED	O.G. FIG.
BY	CLASS/SUBC.
CRAFTSMAN	

16/71

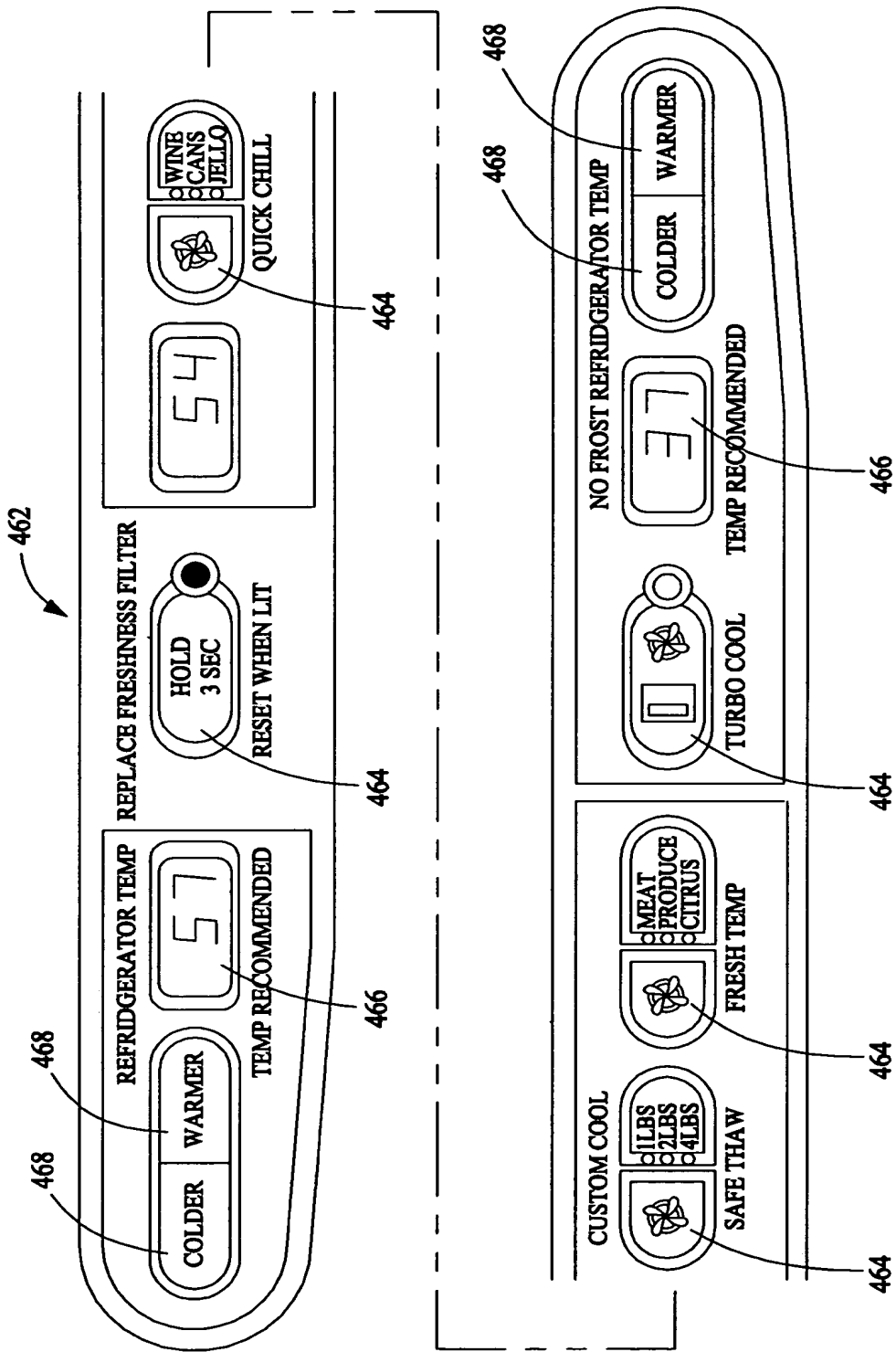


FIG. 16



APPROVED	O.G. FIG.
BY	CLASS SUBCL.
CRAFTSMAN	

17/71

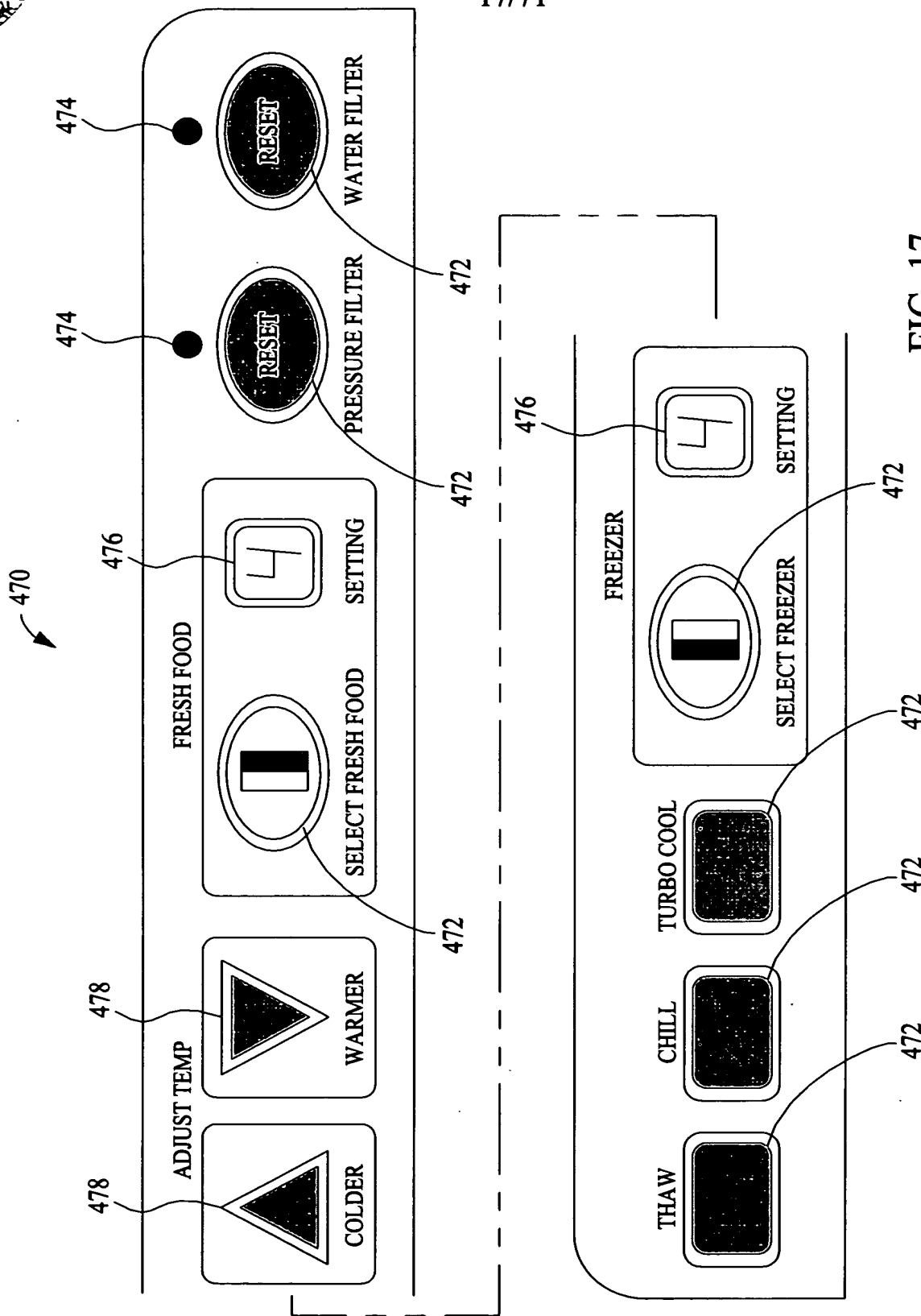
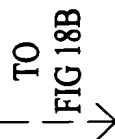


FIG. 17





19/71

APPROVED	BY	DATE
DESIGNED	BY	DATE
DRAWN	BY	DATE
CHECKED	BY	DATE
CLASSIFIED	BY	DATE
TRAFFICMAN	BY	DATE

TO
FIG 18A

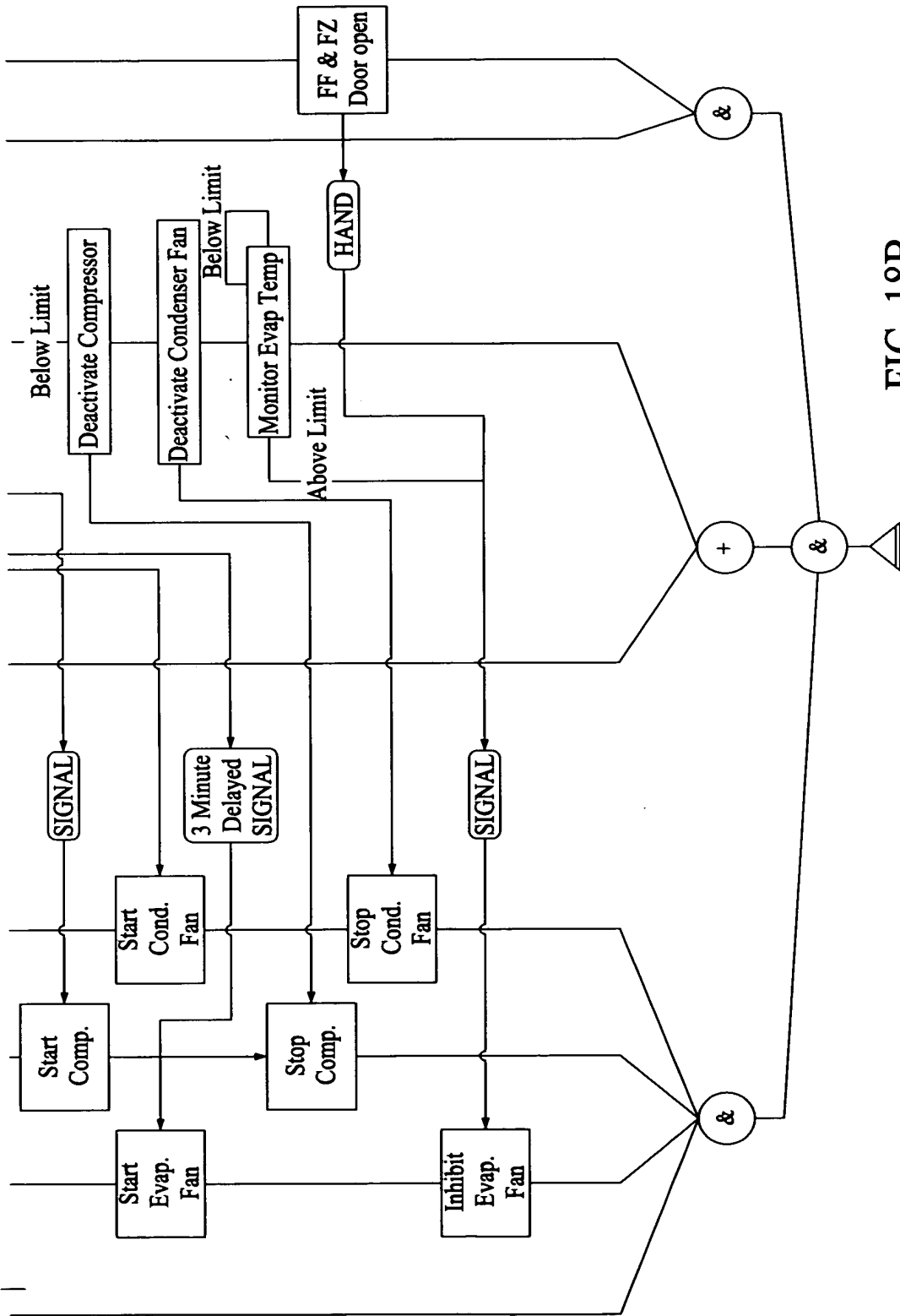
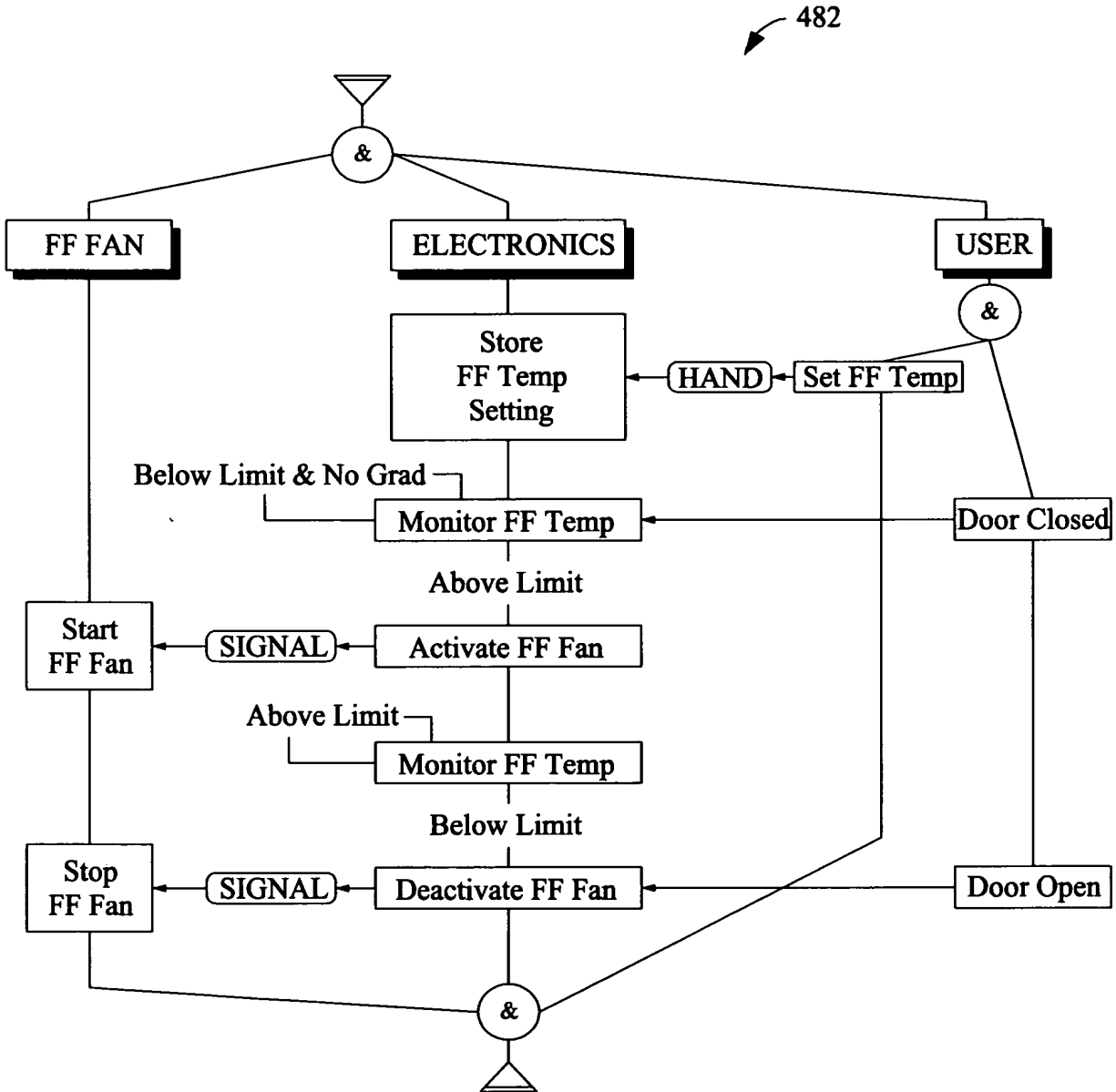
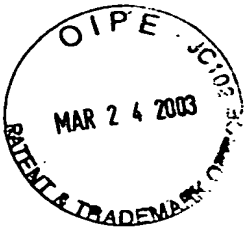


FIG. 18B

Sealed System Behavior Diagram

20/71



Fresh Food Fan Behavior Diagram

FIG. 19



21/71

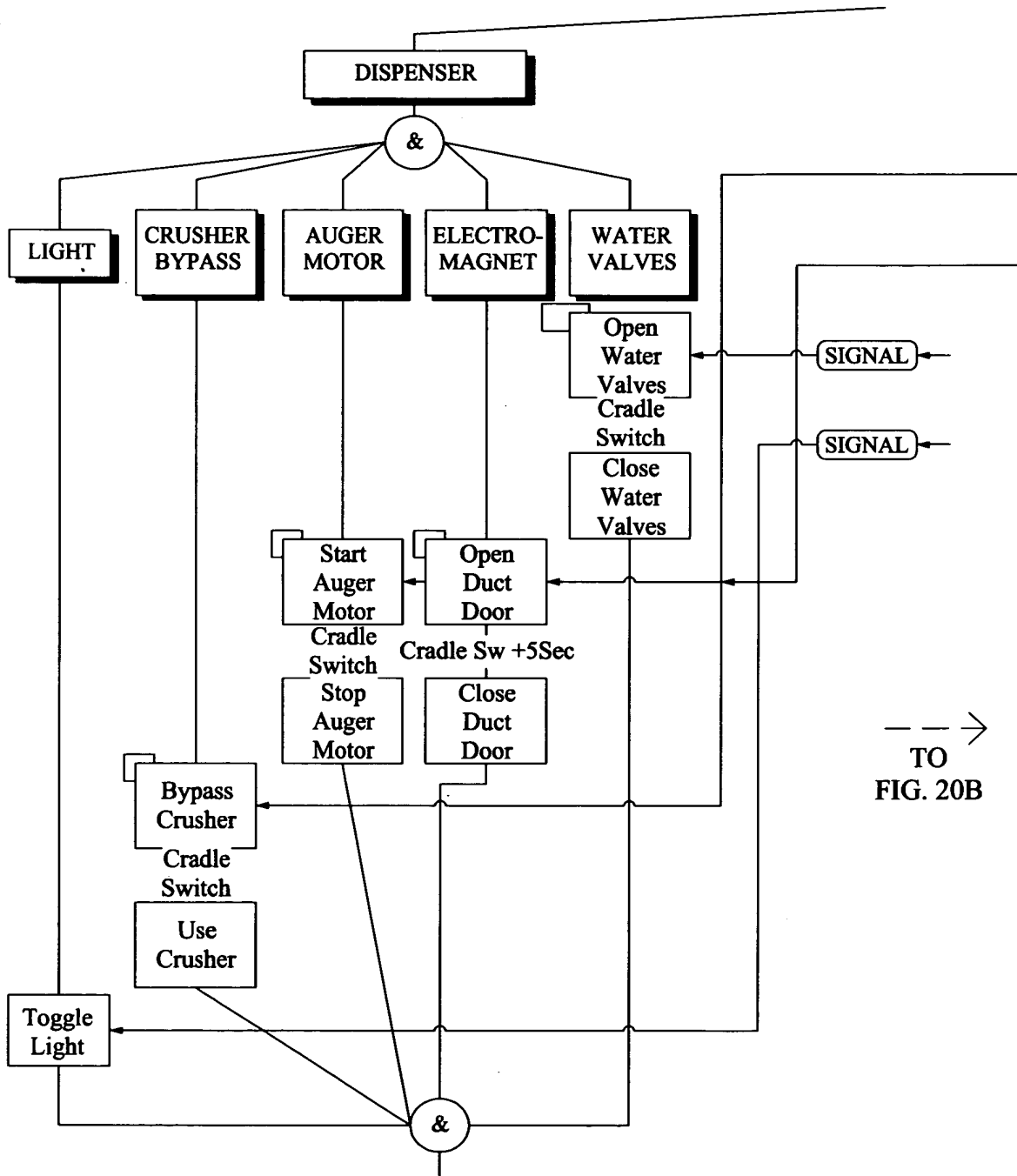


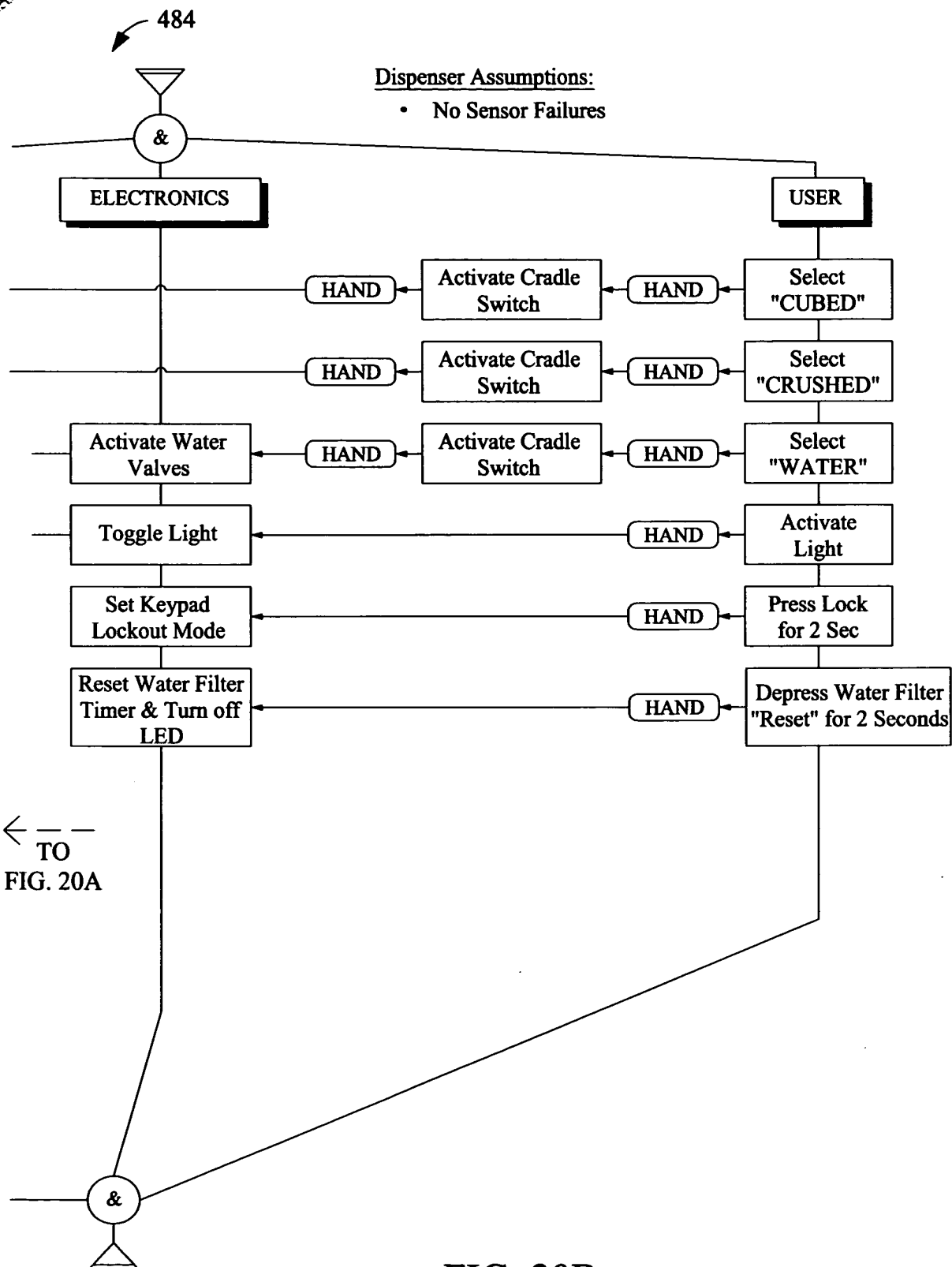
FIG. 20A

Dispenser Behavior



22/71

APPROVED BY CLASS SUBCRAFTSMAN
O.G. FIG.



← TO
FIG. 20A

FIG. 20B



23/71

486

Dispenser Assumptions:

- No Sensor Failures

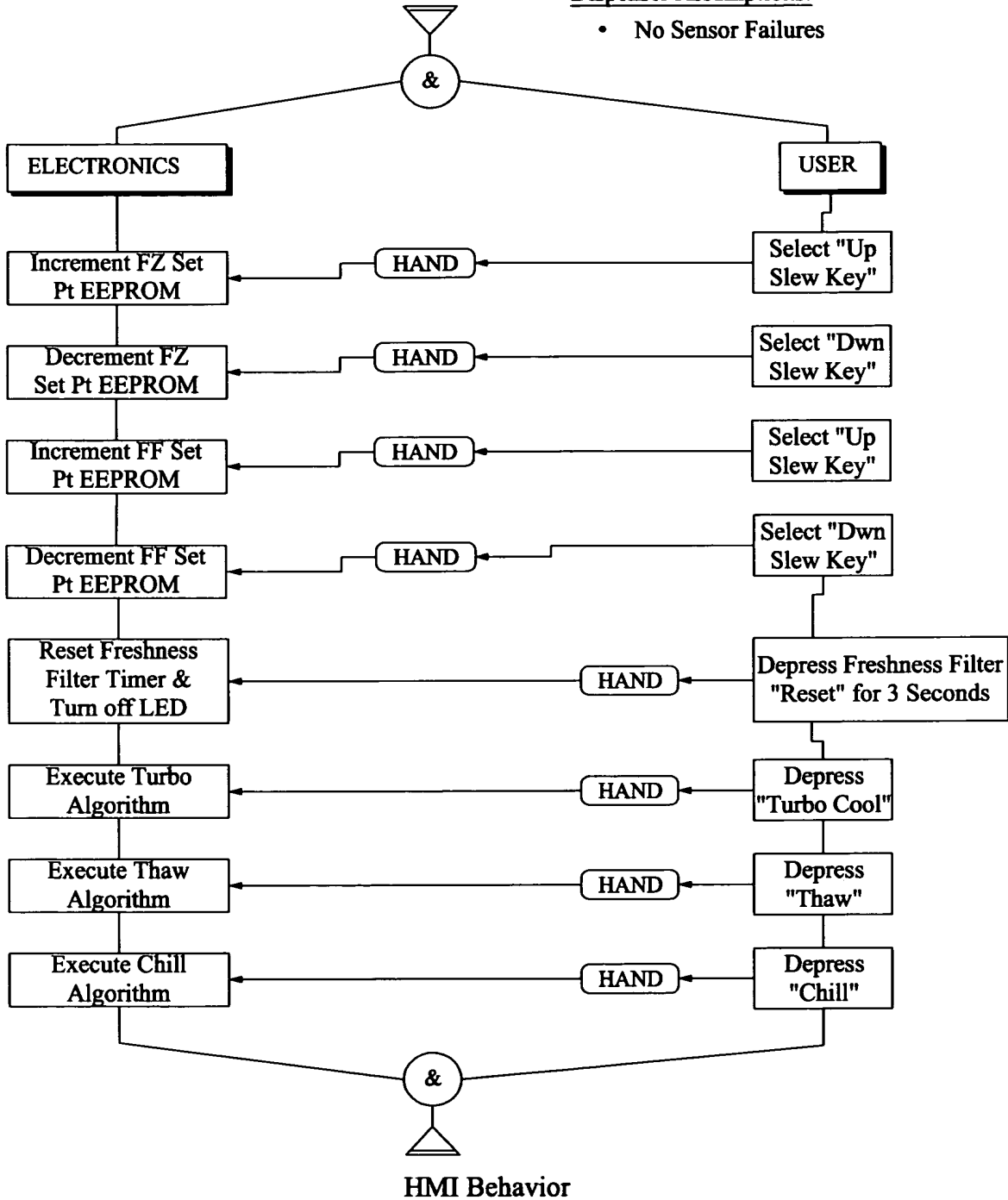


FIG. 21

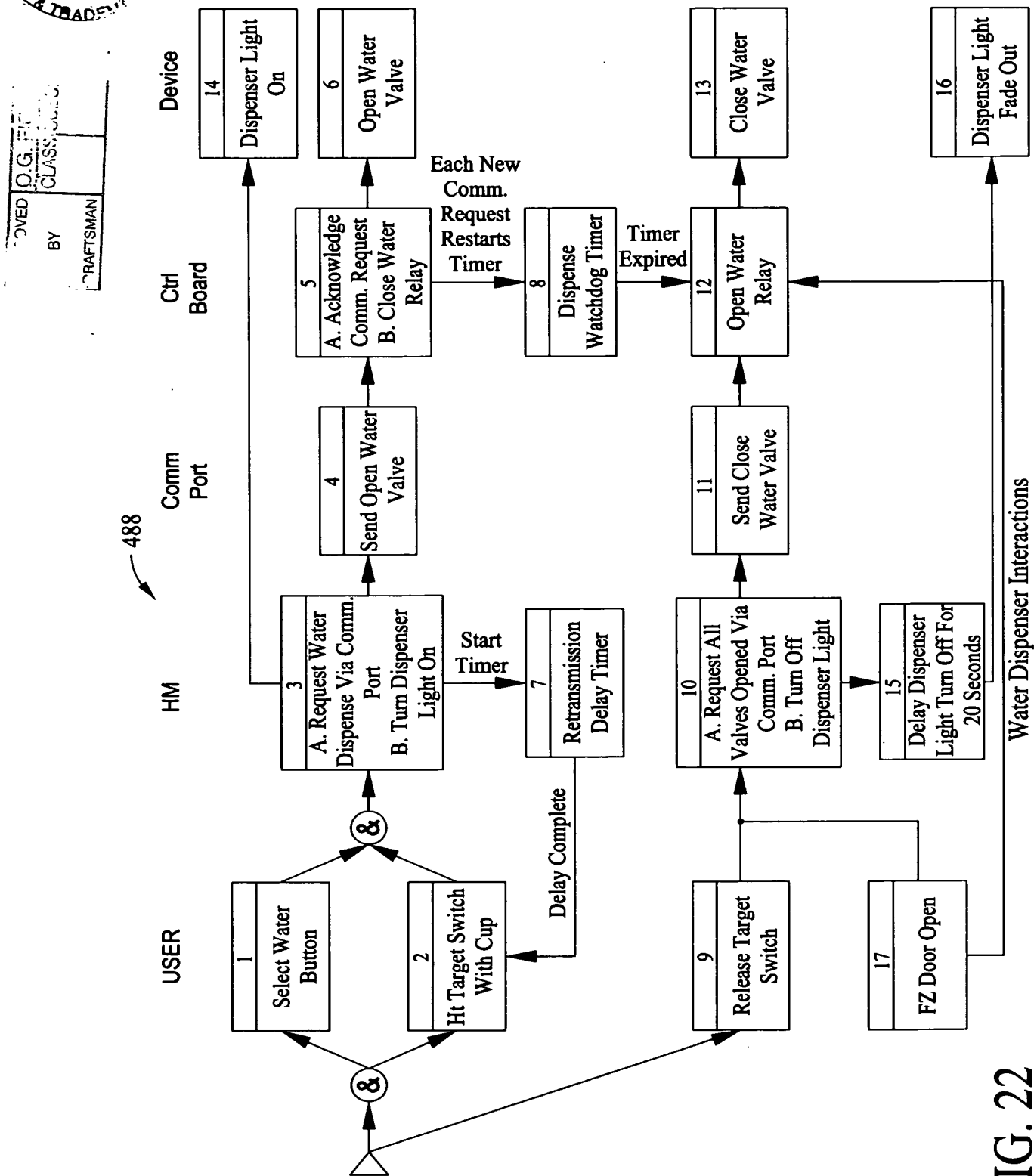


FIG. 22

25/71

APPROVED BY: []
 CLASS: []
 SUBCLASS: []
 DRAFTSMAN: []

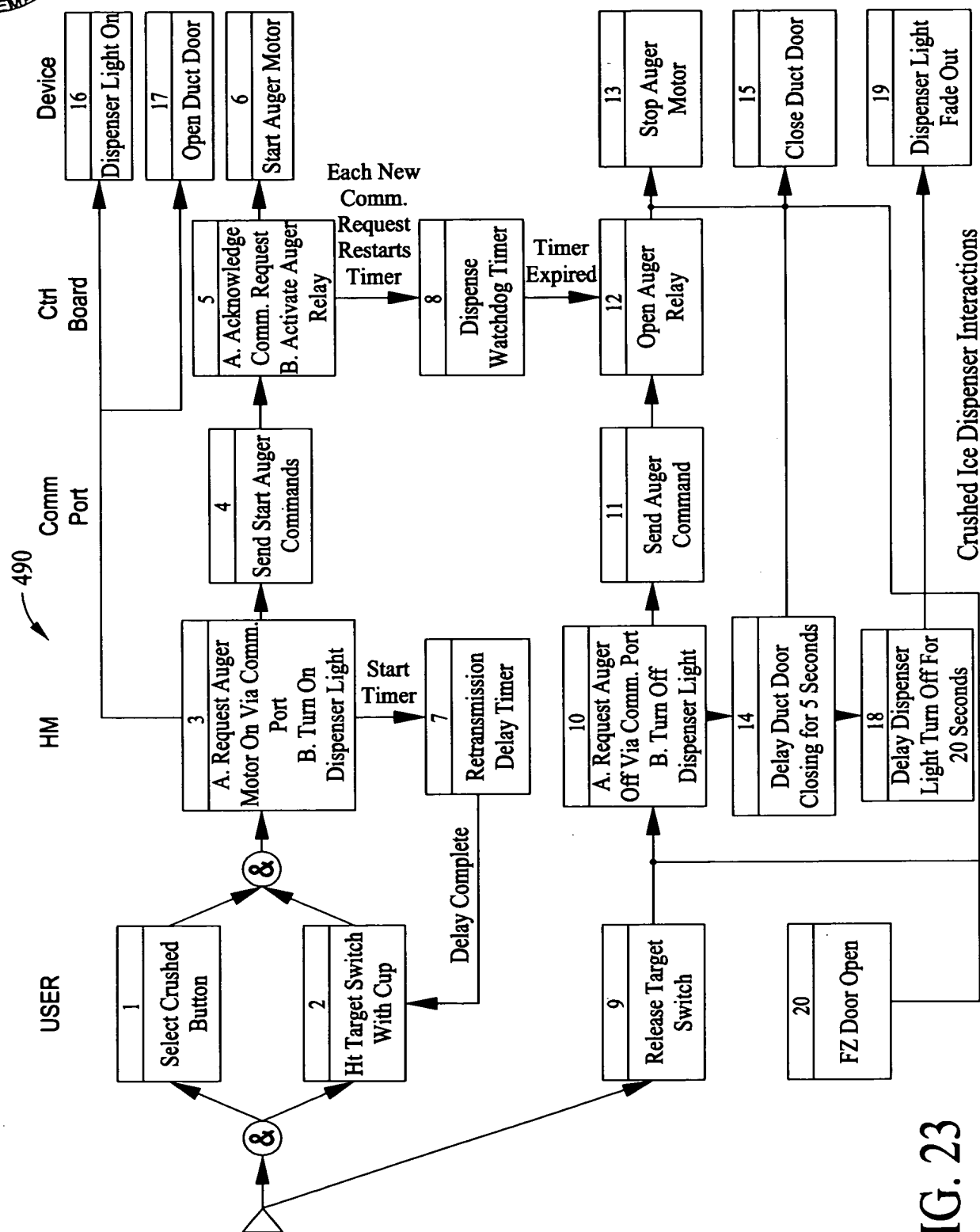


FIG. 23

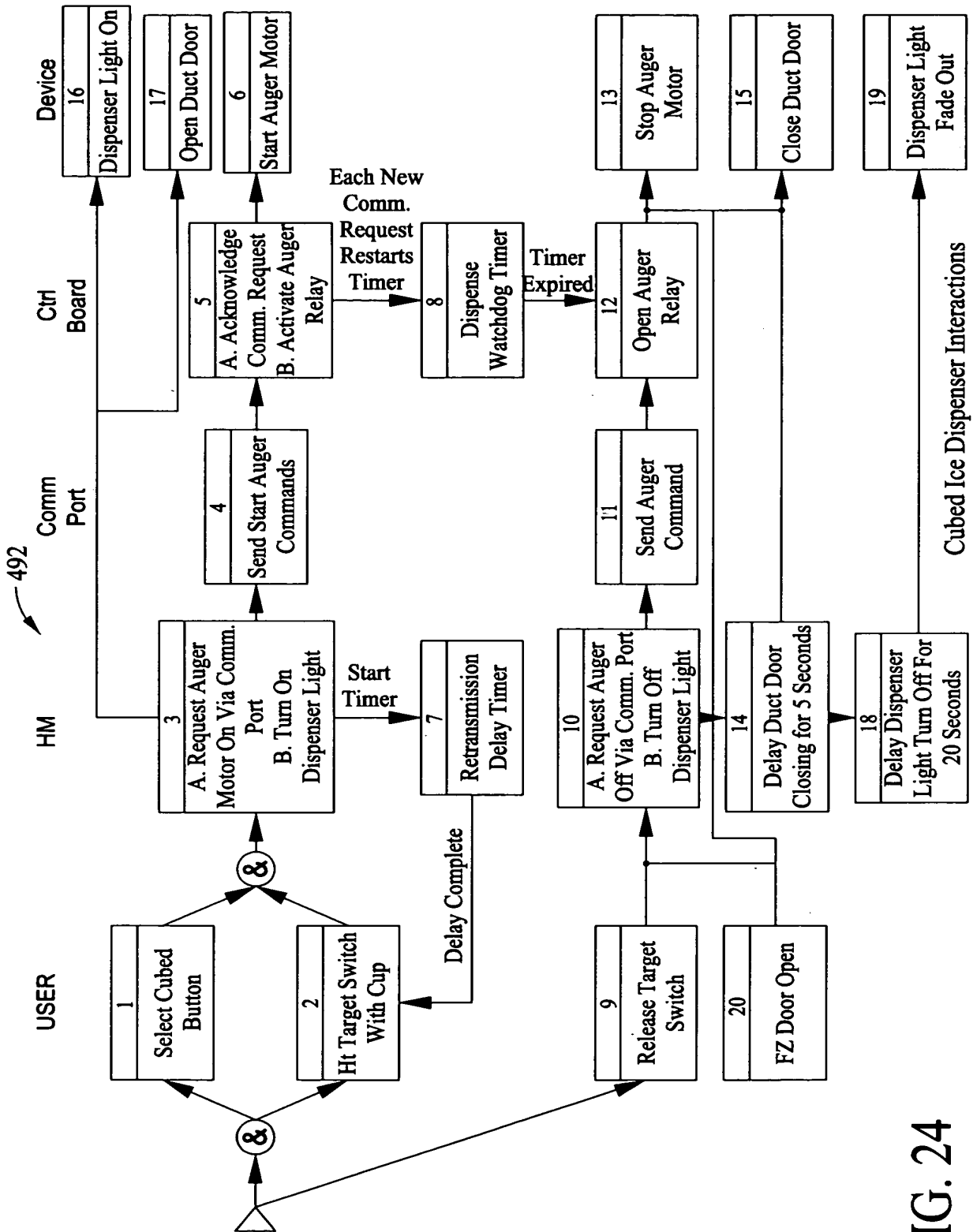
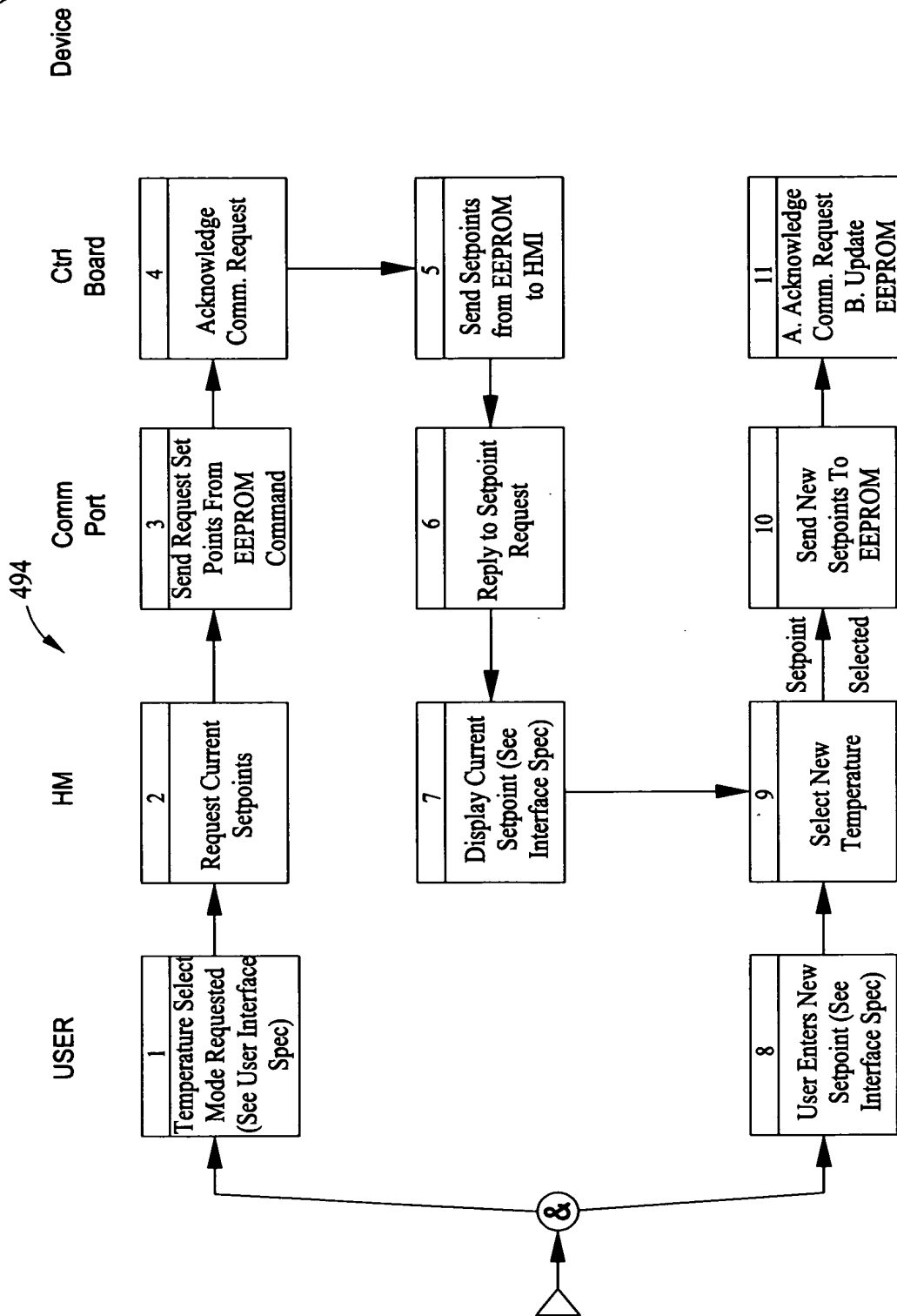


FIG. 24

27/71



APPROVED	O.G. FIG.
BY	CLASS/SUBCL.
DRAFTSMAN	



NOTE: Setpoint Selected implies that the final selection has been made and that the selection has timed out.

FIG. 25

Temperature Setting Interaction Diagrams

28/71



FILED	O.G. FIG.
BY	CLASS. SUBCL.
CRAFTSMAN	

496

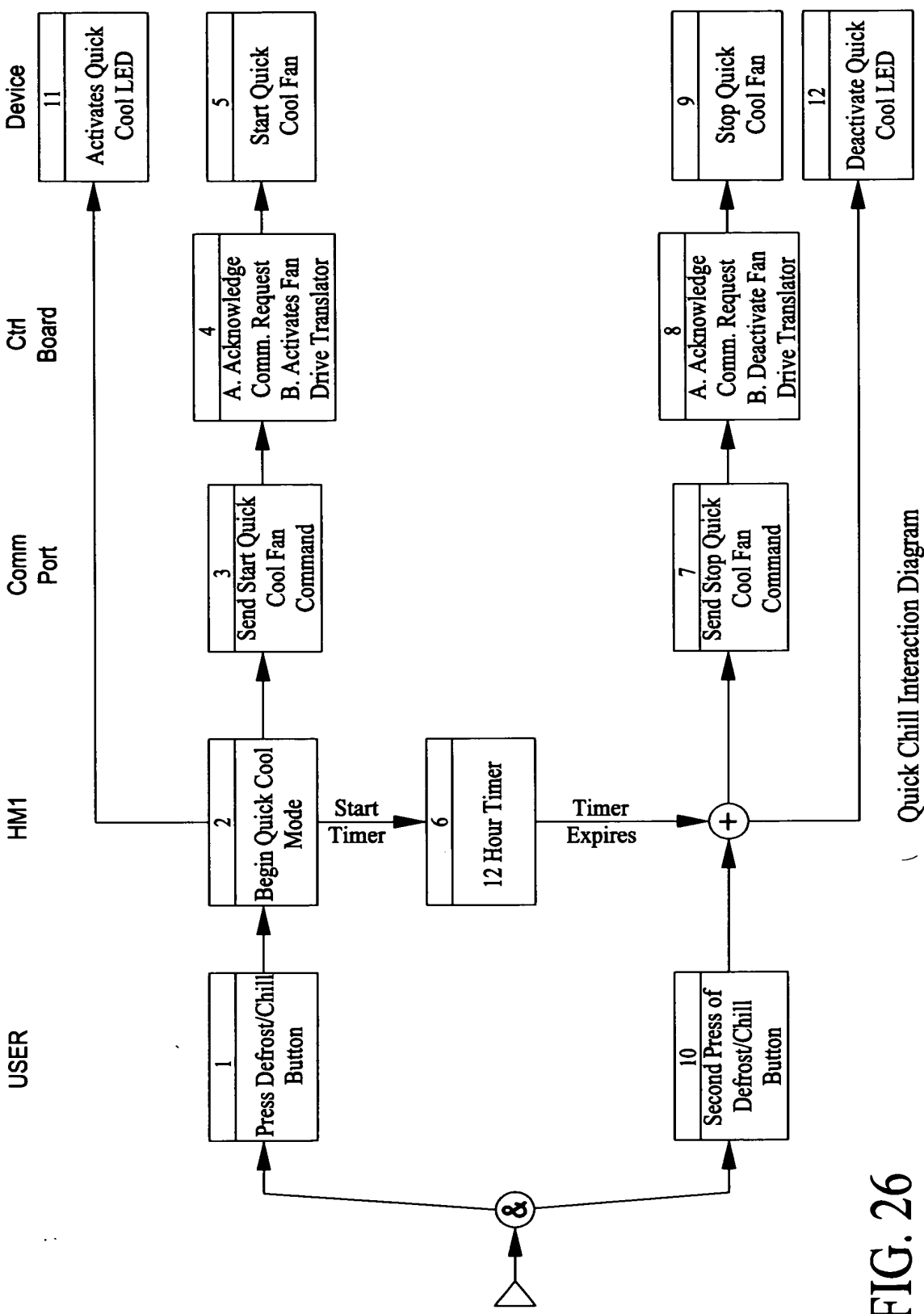


FIG. 26

29/71

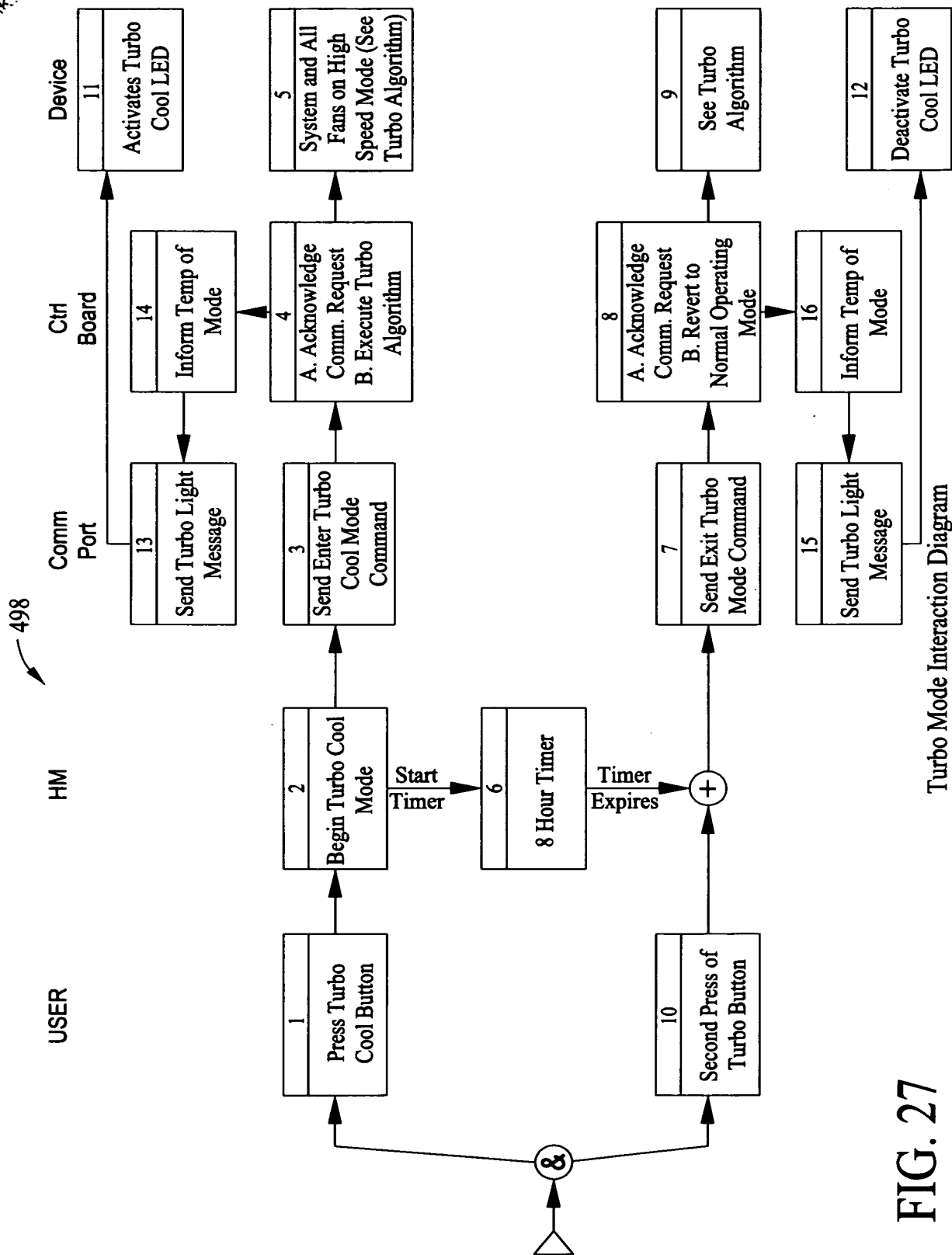


FIG. 27



APPROVED BY CLASS SUBCRAFTSMAN

30/71

500

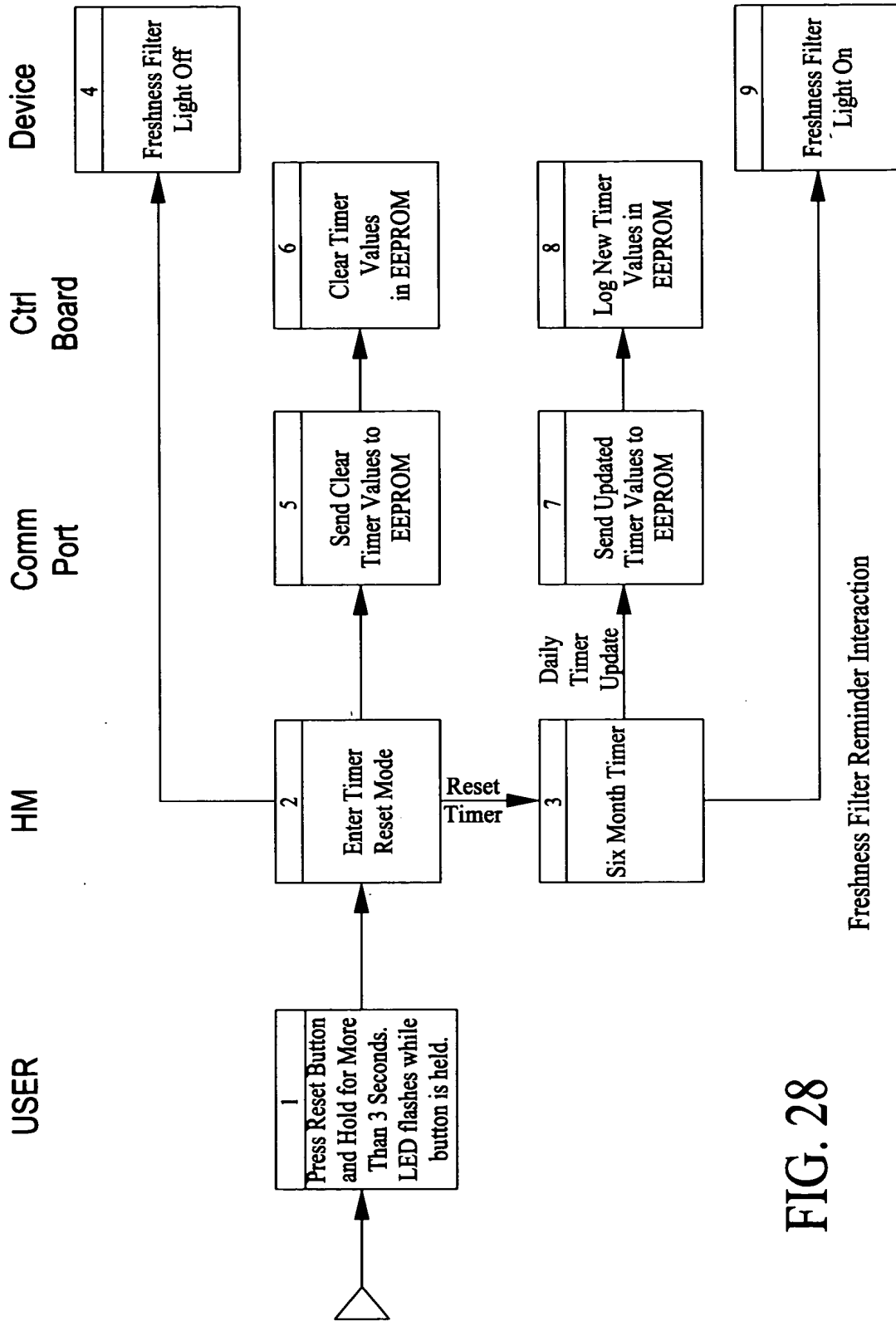


FIG. 28



APPROVED	O.G. FIG.
BY	CLASS/SUBCL.
DRAFTSMAN	

31/71



APPROVED	O.G. FIG.
BY	CLASS/SUBCL.
DRAFTSMAN	

502

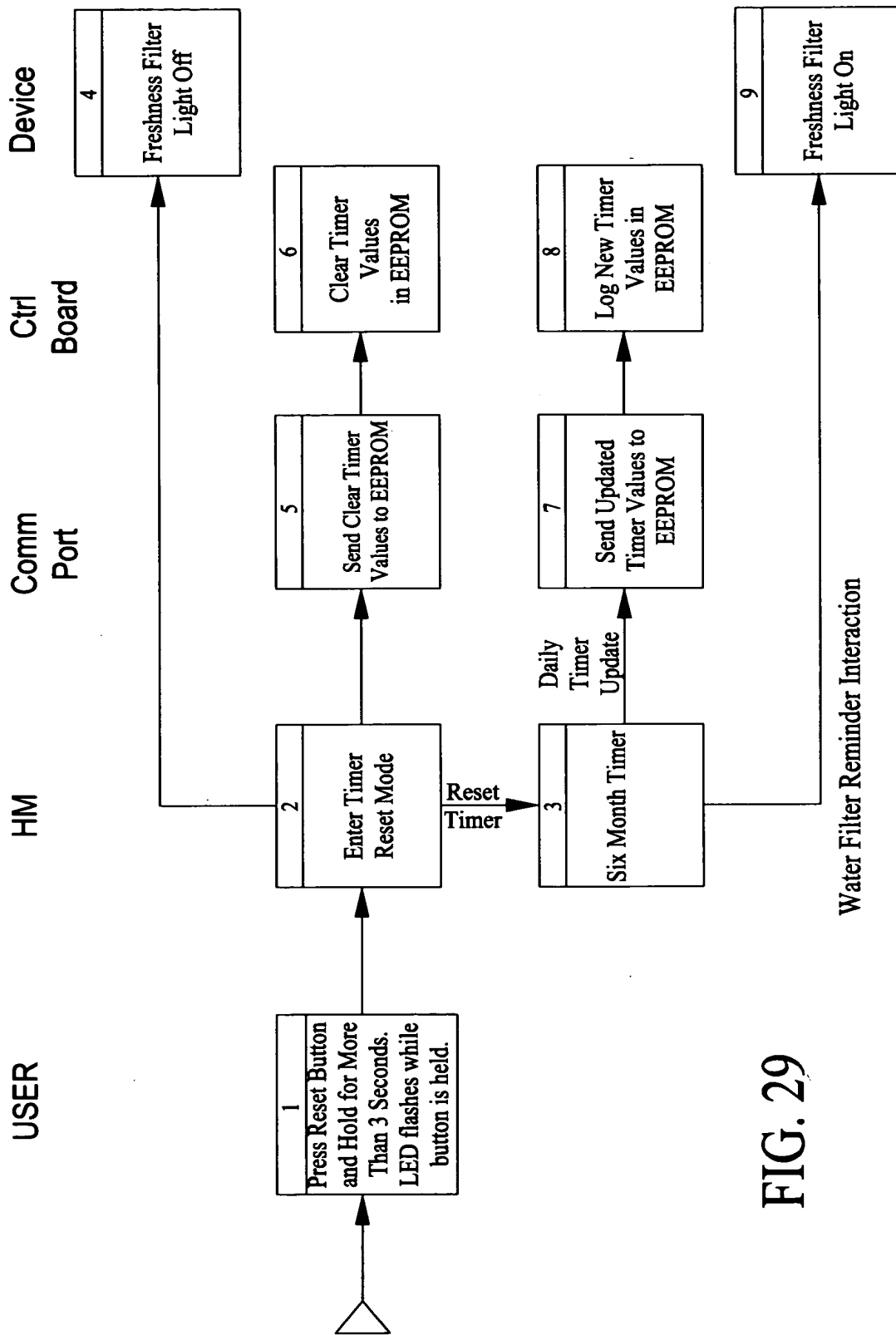
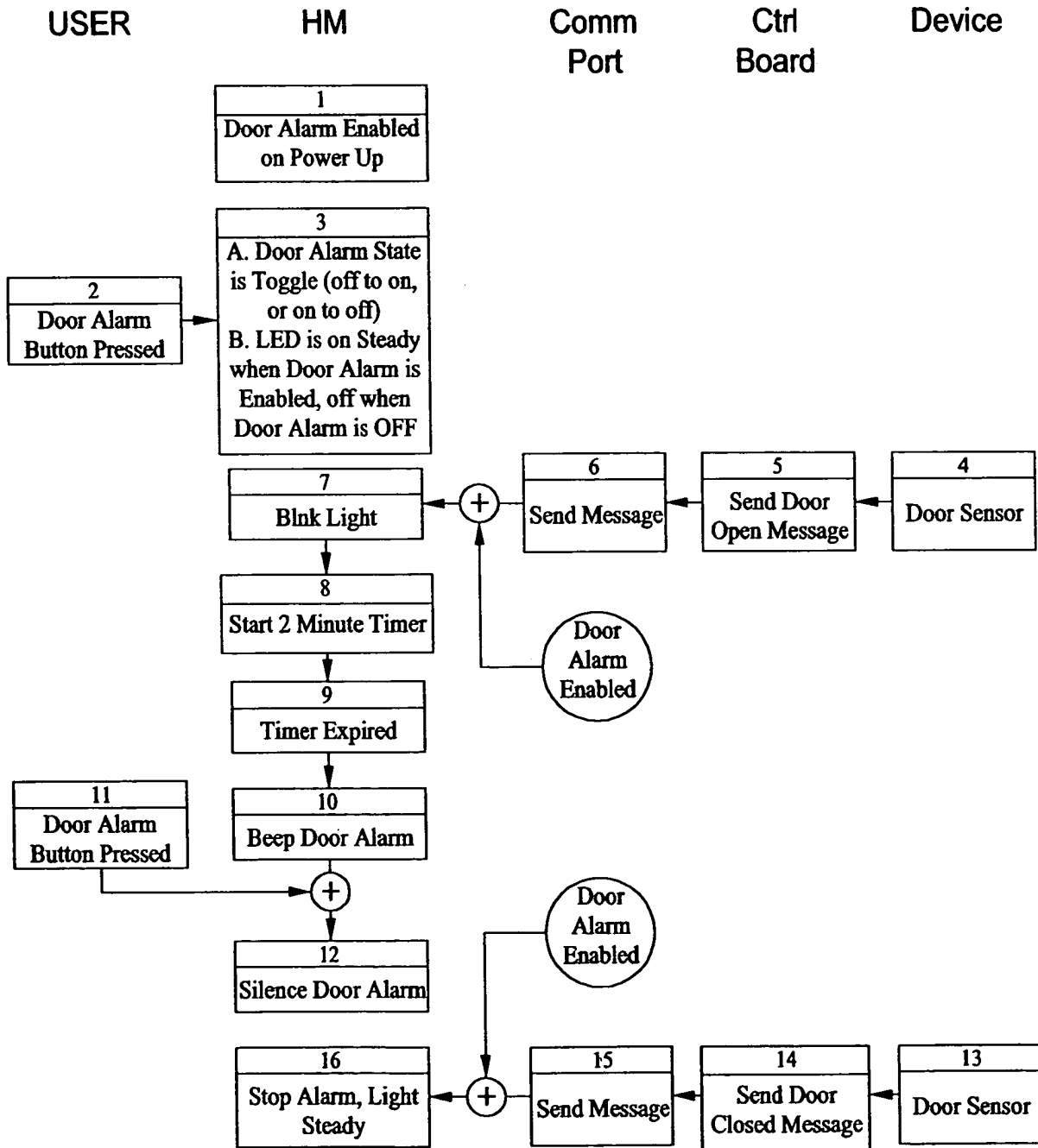


FIG. 29

APPROVED BY: []
 O.G. FIG. []
 CLASS/SUBCL. []
 DRAFTSMAN []

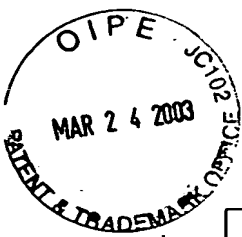
32/71

504

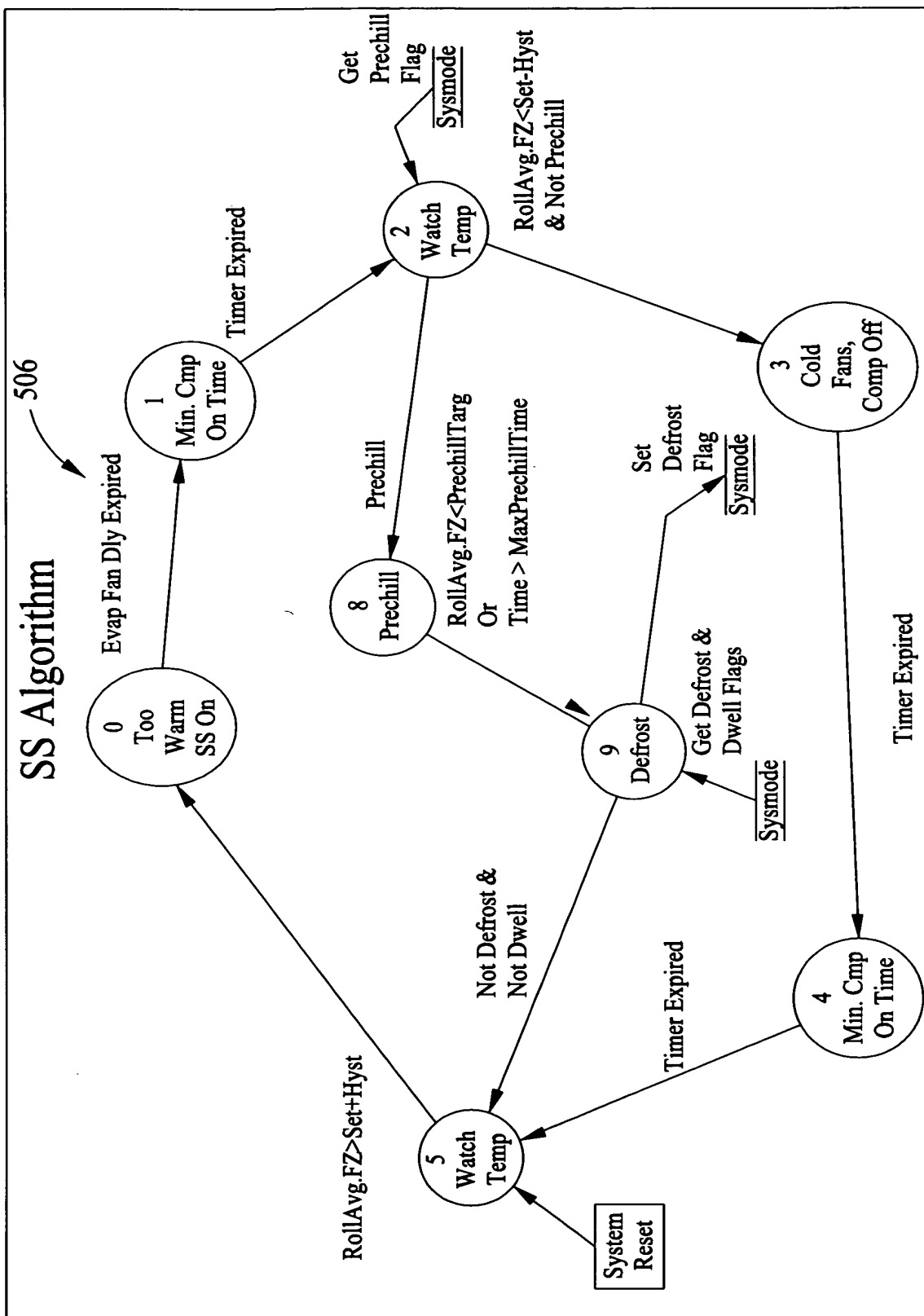


Door Open Interaction Diagram

FIG. 30



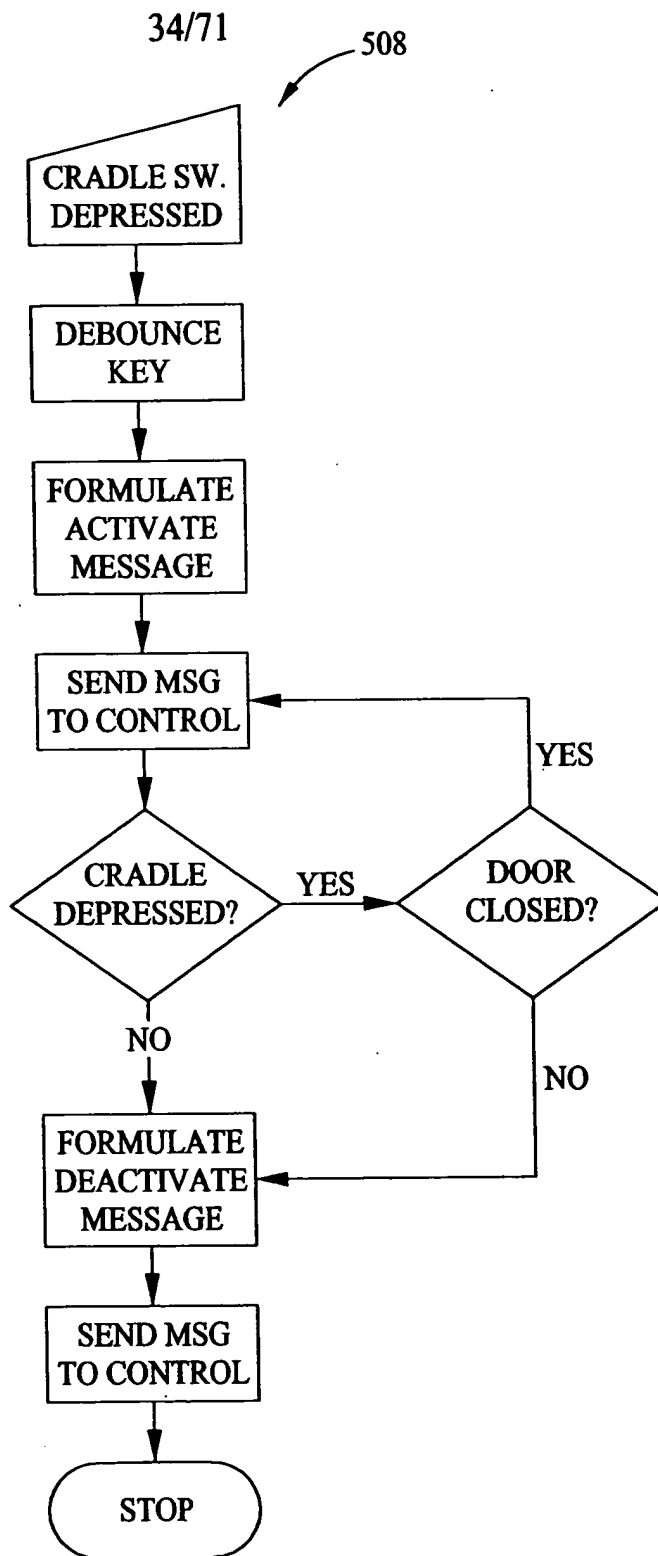
33/71



Sealed System Operational Algorithm

FIG. 31

DESIGNED BY	Q.G. FIG.
DRAFTSMAN	CLASS SUBCL.



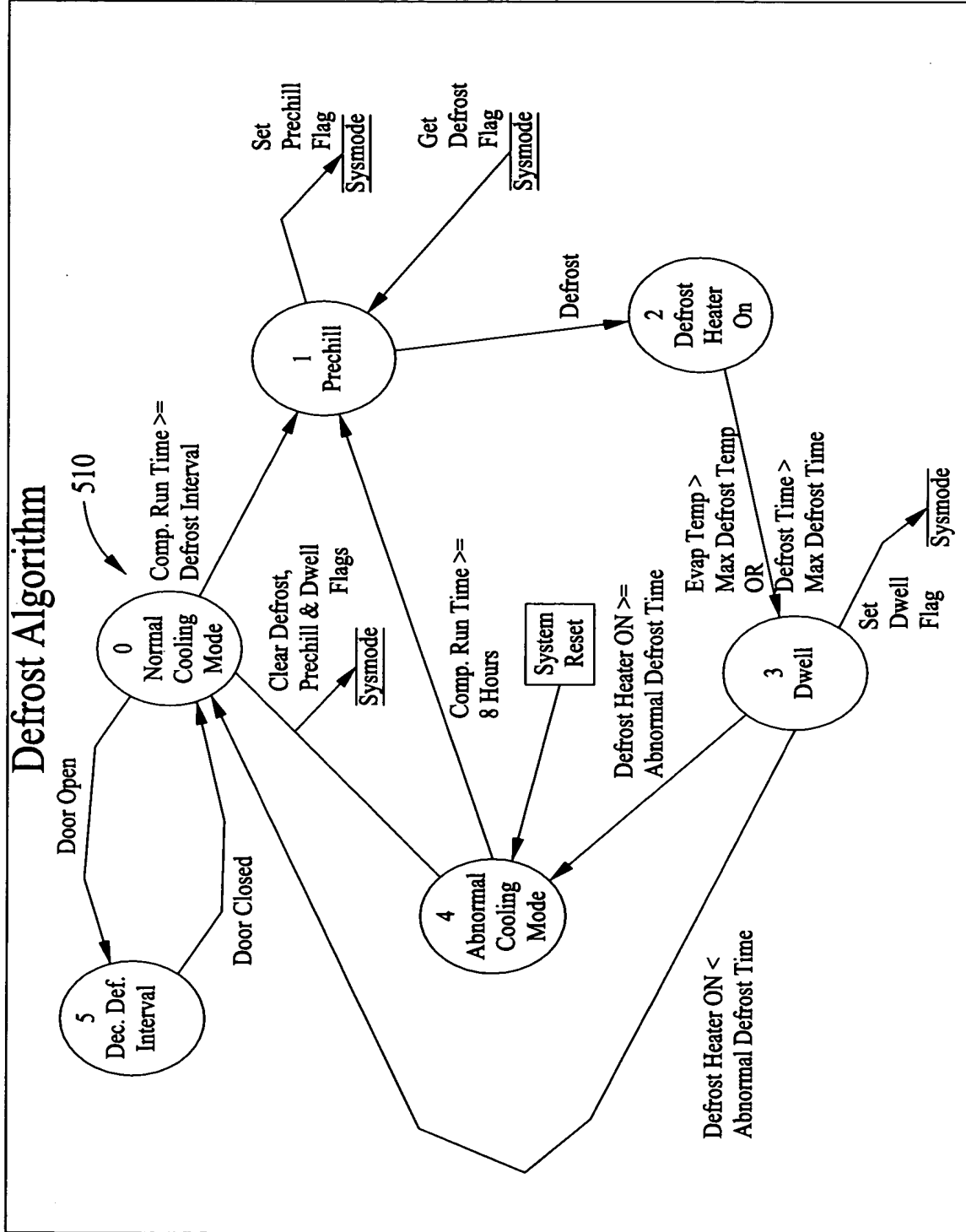
Dispenser Control Algorithm

FIG. 32

35/71



DESIGNED BY	CLASSIFIED	FIG. NO.
DRAFTSMAN	SUBCL.	



Defrost Control State Diagram

FIG. 33

36/71

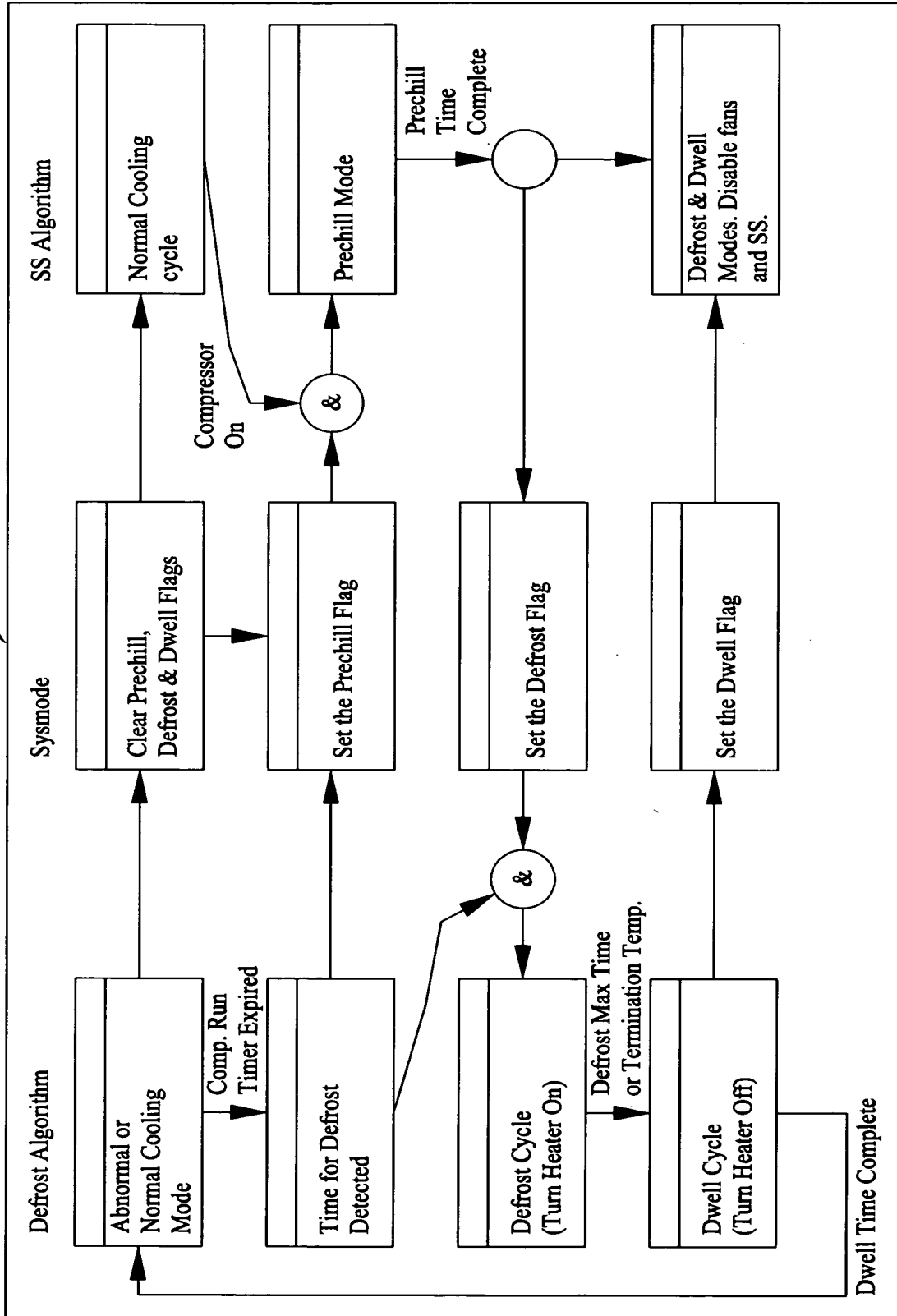


FIG. 34

512



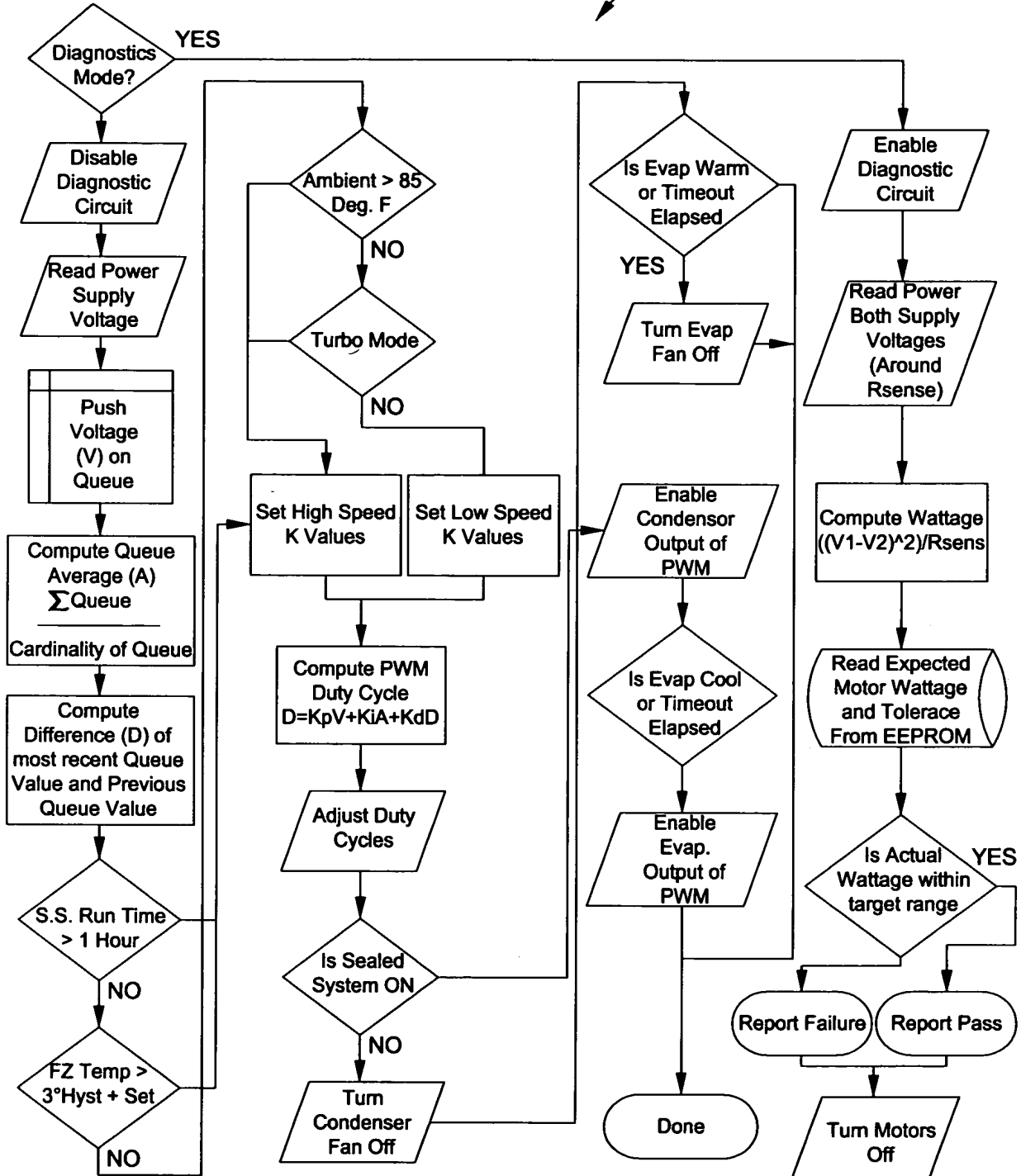
COPIED	O.G. FIG.
BY	CLASS SUBC.
CRAFTSMAN	



37/71

514

Evap. & Cond.Fan Control:



Fan Speed Control

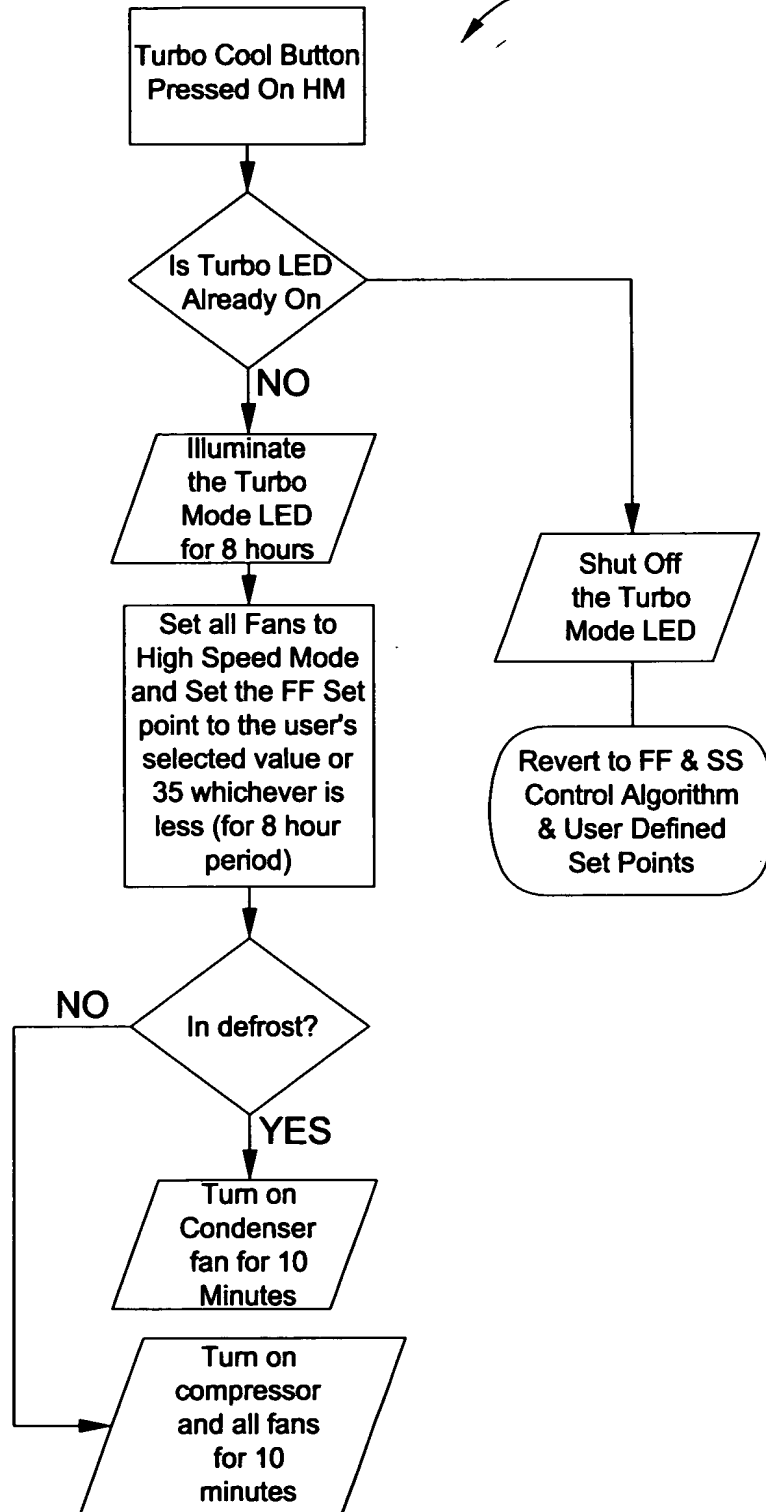
- Notes:
1. The FF & Evaporator fans will shut off for the first five minutes that the door is open
 2. Only one fan at a time can be on at a time during diagnostics.
 3. Once the fan has been switched to high speed, it remains in that state until the operational cycle is complete.

FIG. 35



38/71

516



Turbo Cycle Algorithm

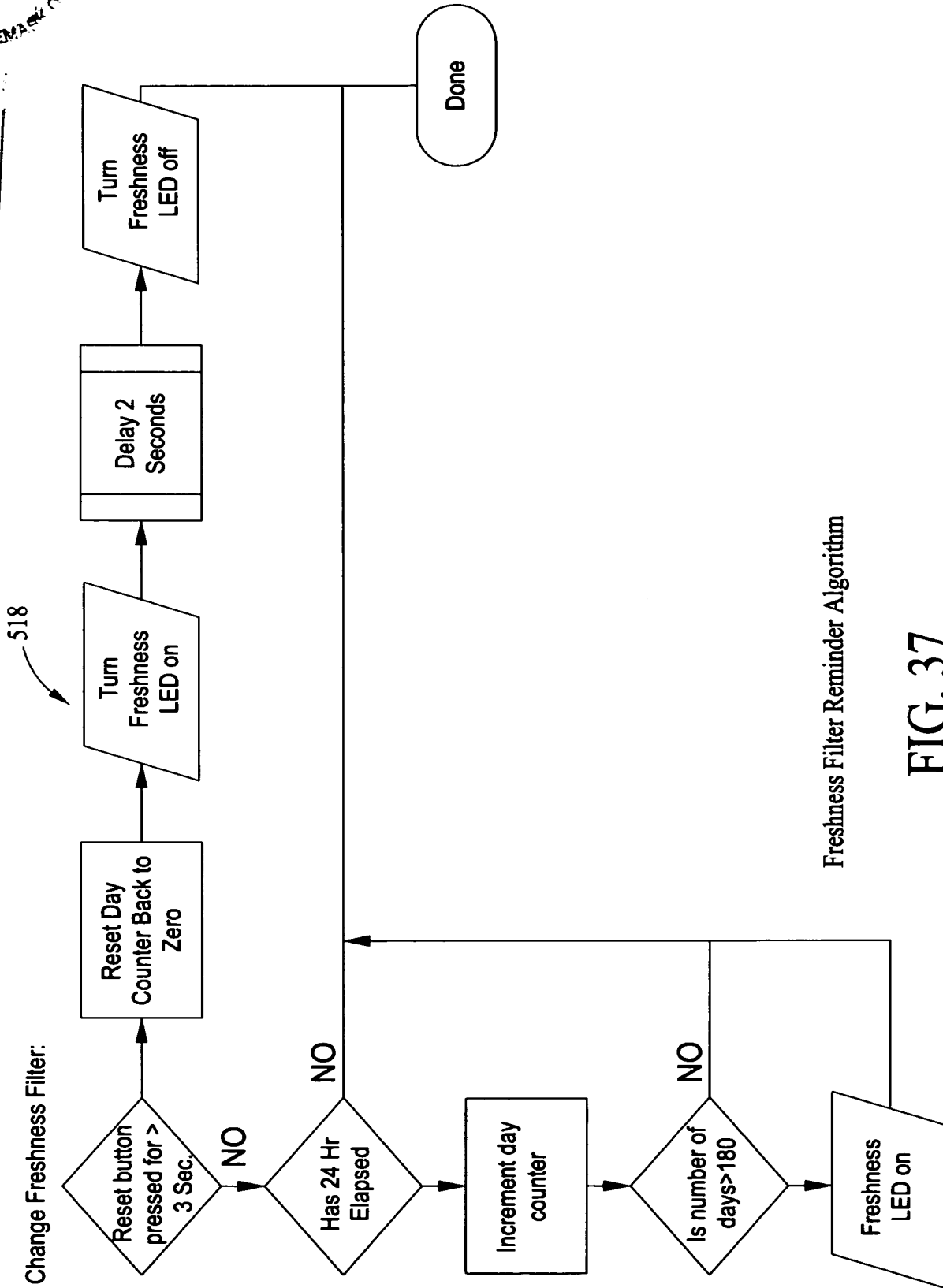
FIG. 36

APPROVED	O.G. FIG.	CLASS	SUBCL.
BY			
DRAFTSMAN			

39/71



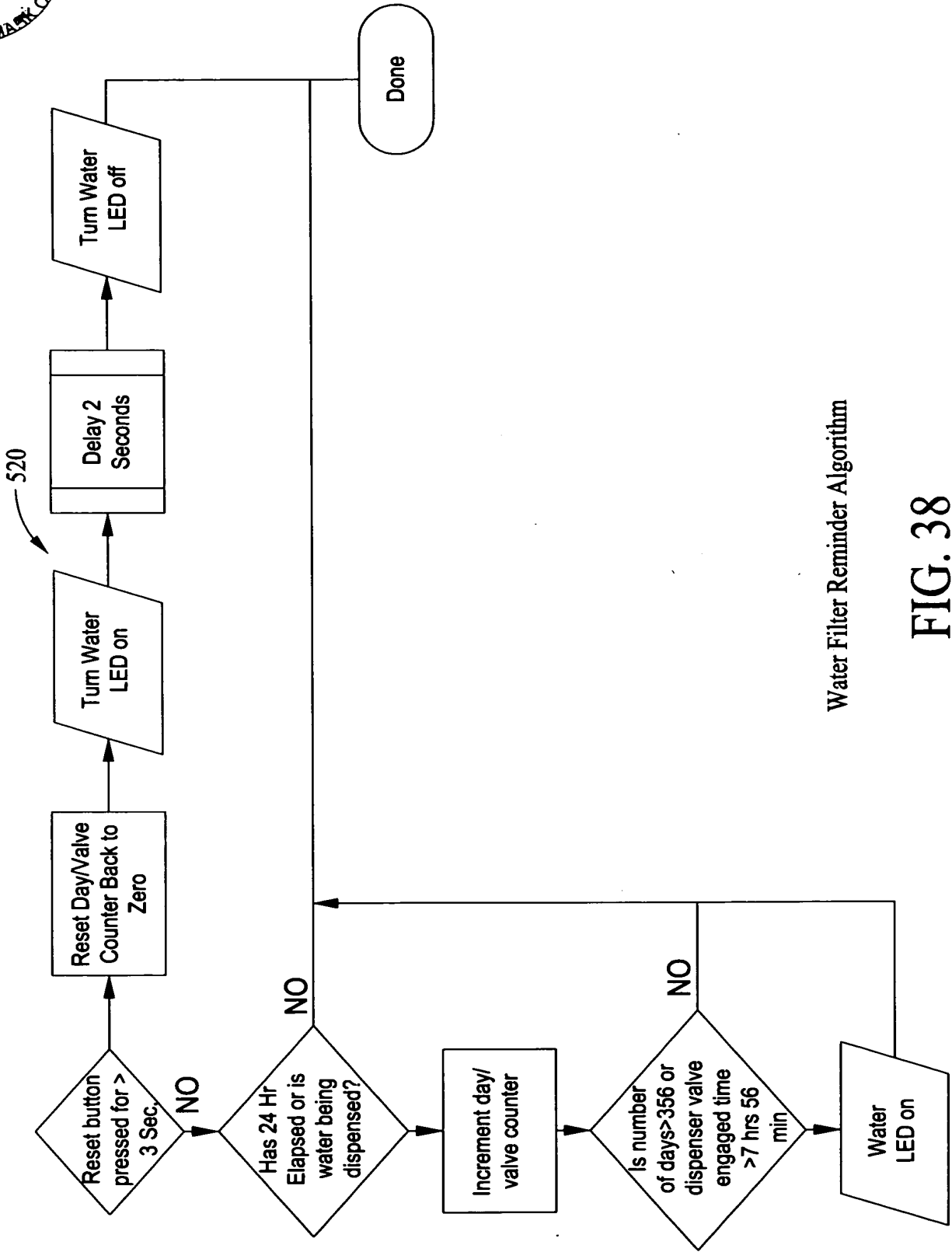
APPROVED	O.G. FIG.
BY	CLASS/SUBCL.
DRAFTSMAN	





40/71

APPROVED	O.G. FIG.
BY	CLASS/SUBCL.
DRAFTSMAN	

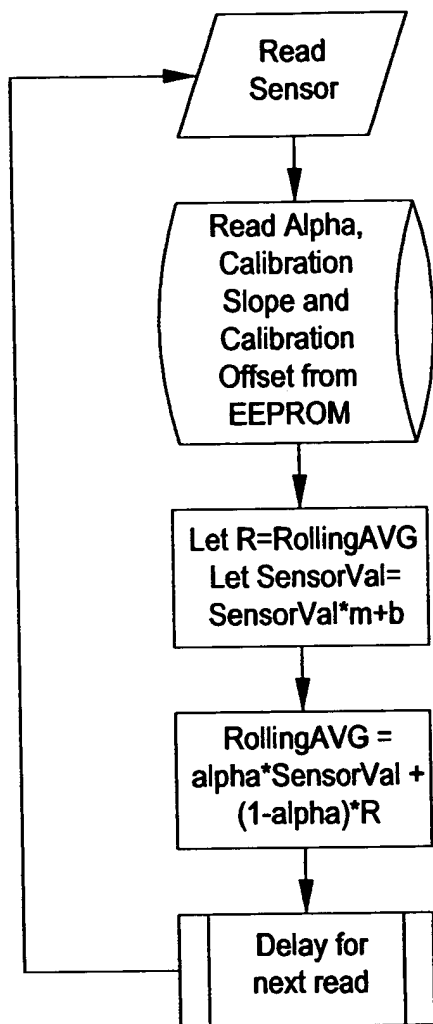


Water Filter Reminder Algorithm

FIG. 38

APPROVED BY CRAFTSMAN
 O.G. FIG. CLASS SUBC.

41/71
 SENSOR READ AND ROLLING AVERAGE ALGO: 522



NOTE:
 Fresh food average uses this algorithm twice to create a 2nd pole filter.

FIG. 39

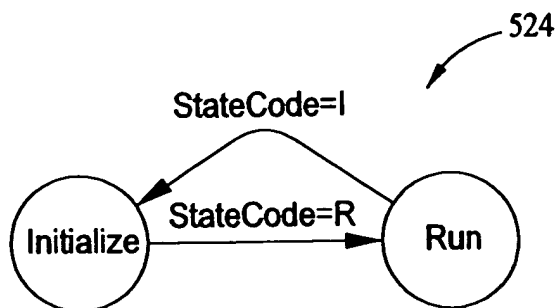
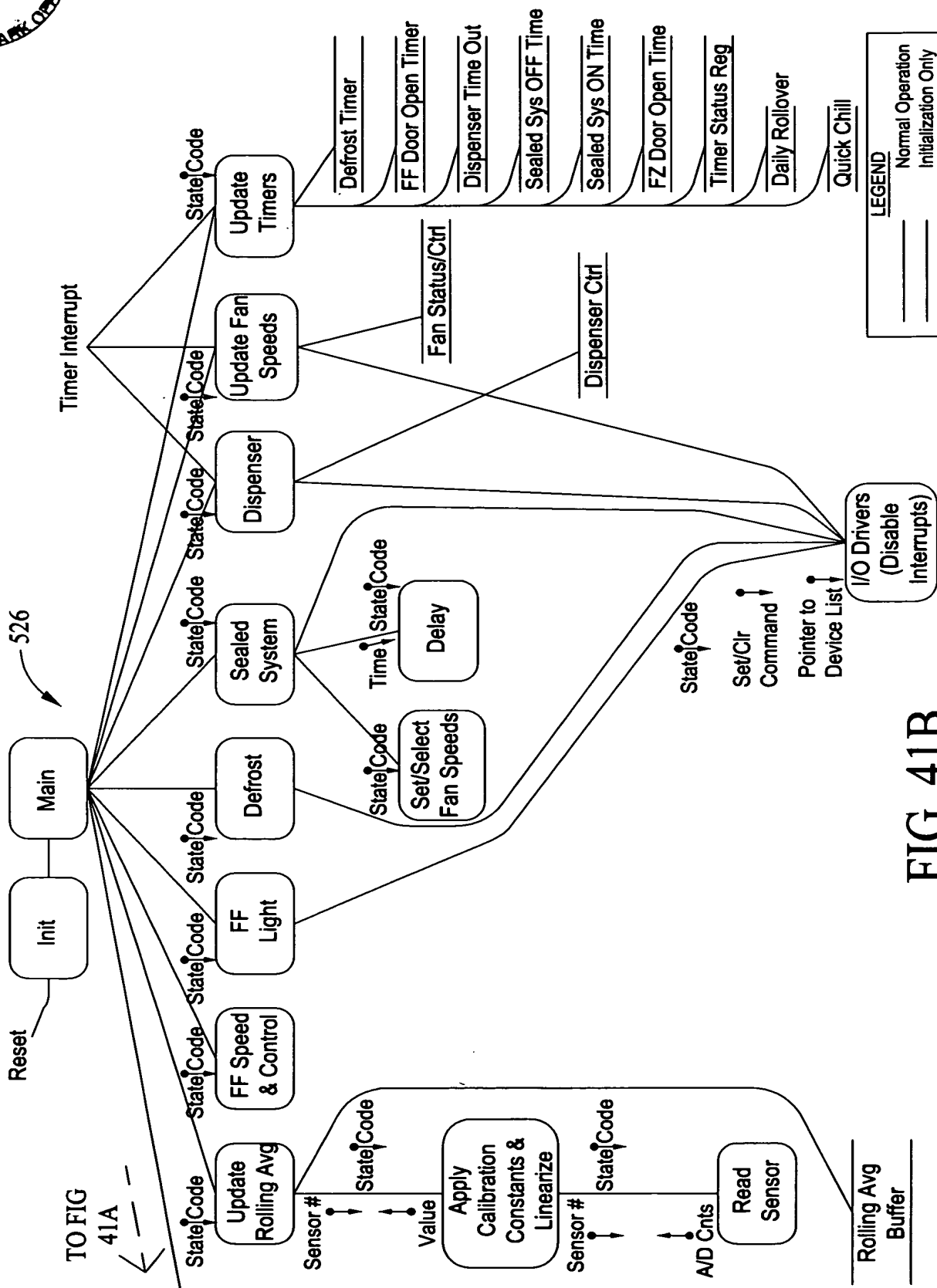
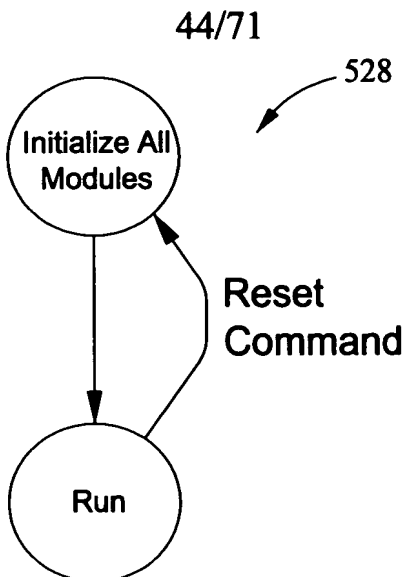


FIG. 40





APPROVED	O.G. FIG.
BY	CLASS/SUBCL.
CRAFTSMAN	



State Diagram For Main Control

FIG. 42

HMI MAIN STATE MACHINE

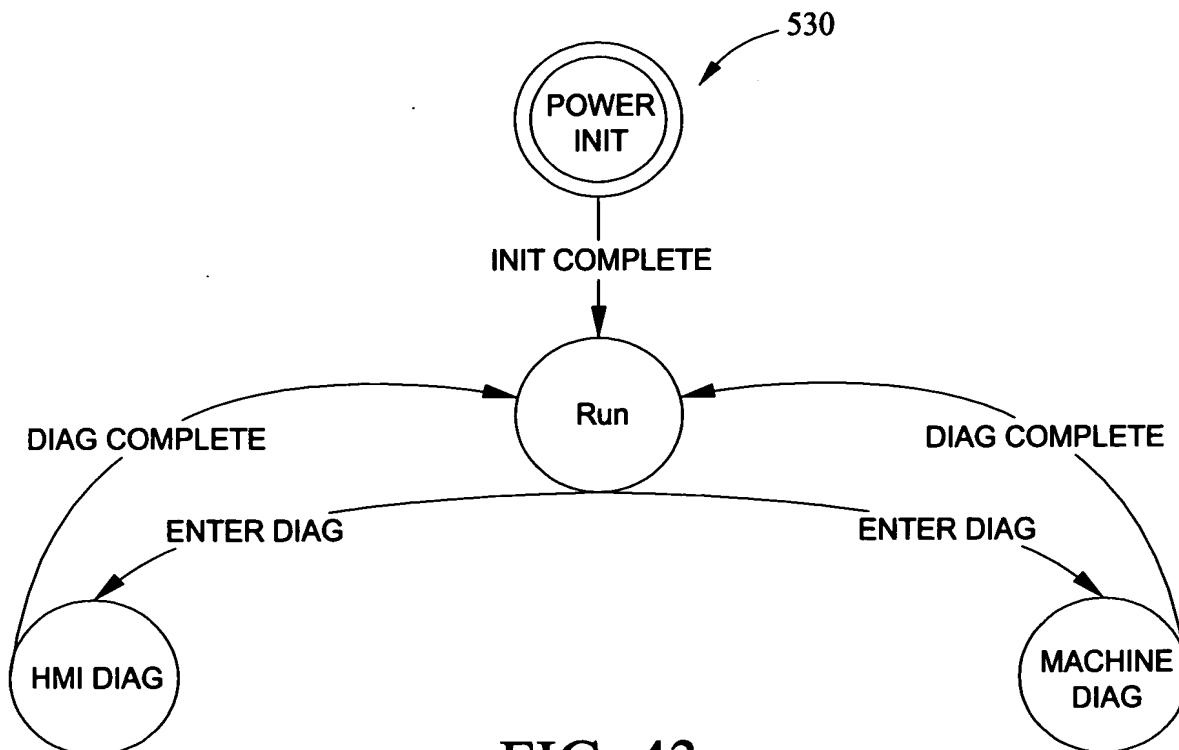
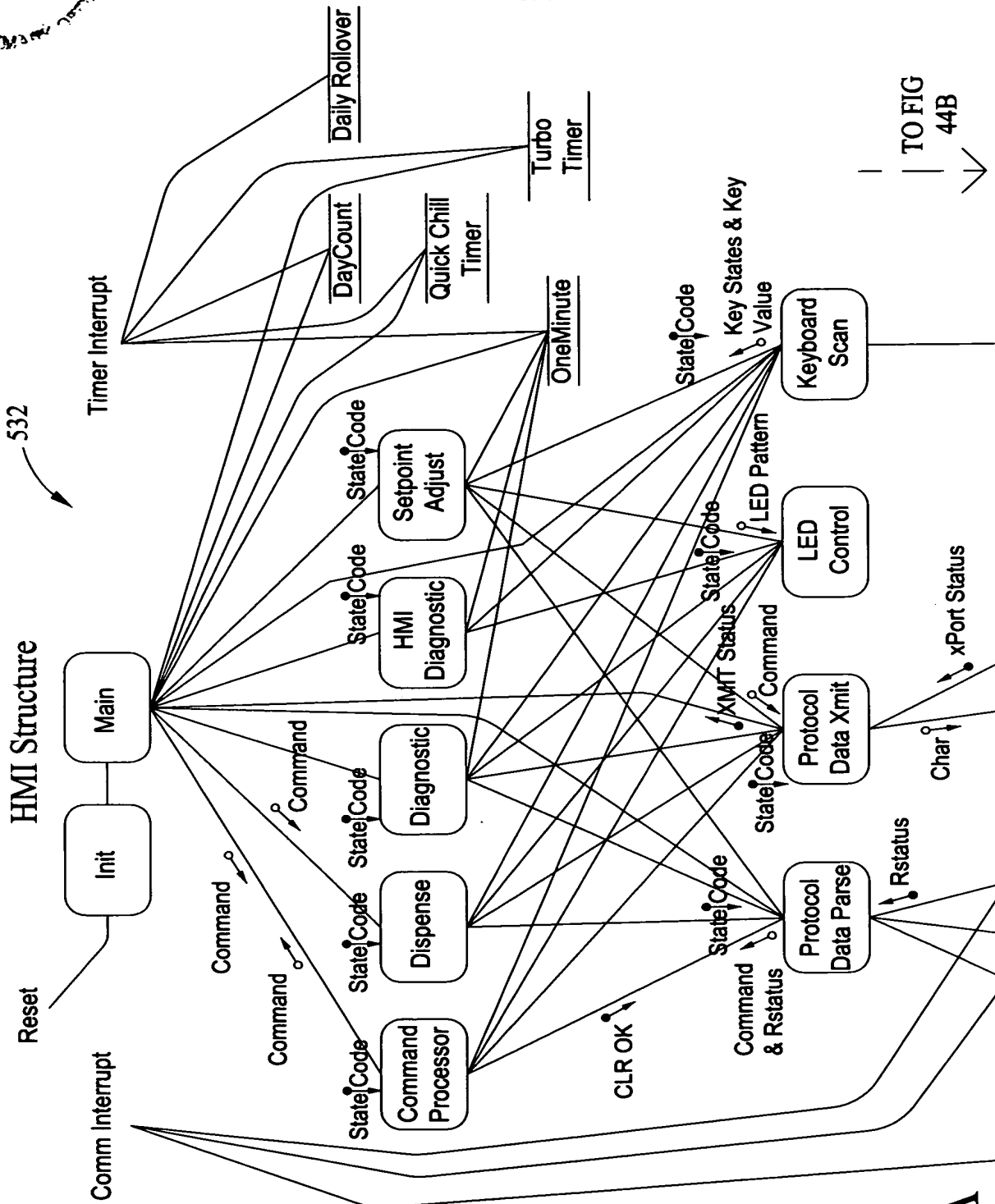


FIG. 43



45/71



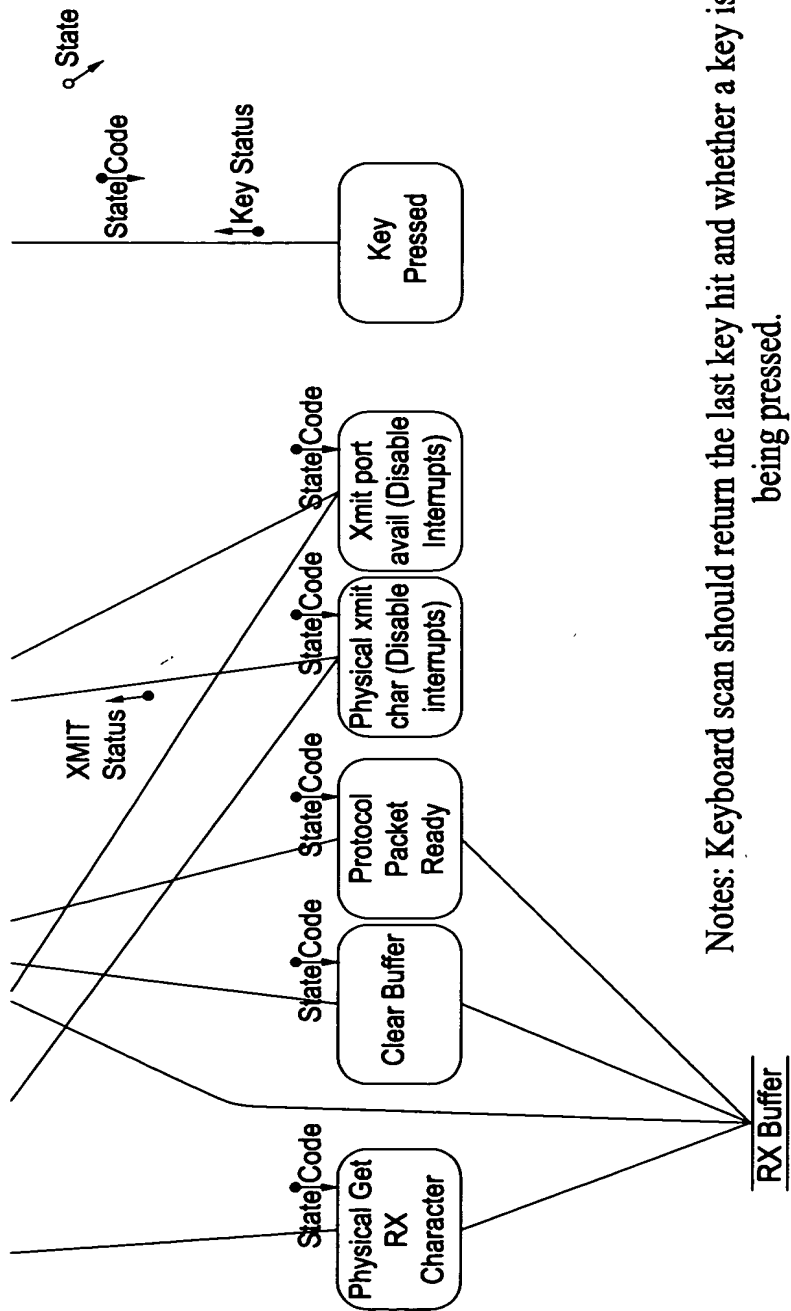
TO FIG 44B

FIG. 44A



APPROVED	Q.G. FIG.
BY	CLASS/SUBCL.
DRAFTSMAN	

TO FIG 44A



Notes: Keyboard scan should return the last key hit and whether a key is presently being pressed.
 # Calls Stack Depth: Main->Diag->Keyboardscan->KeyPressed->Cccom Interrupt->Physical get character

FIG. 44B



APPROVED BY DRAFTSMAN
O.G. FIG. CLASS SUBCL.

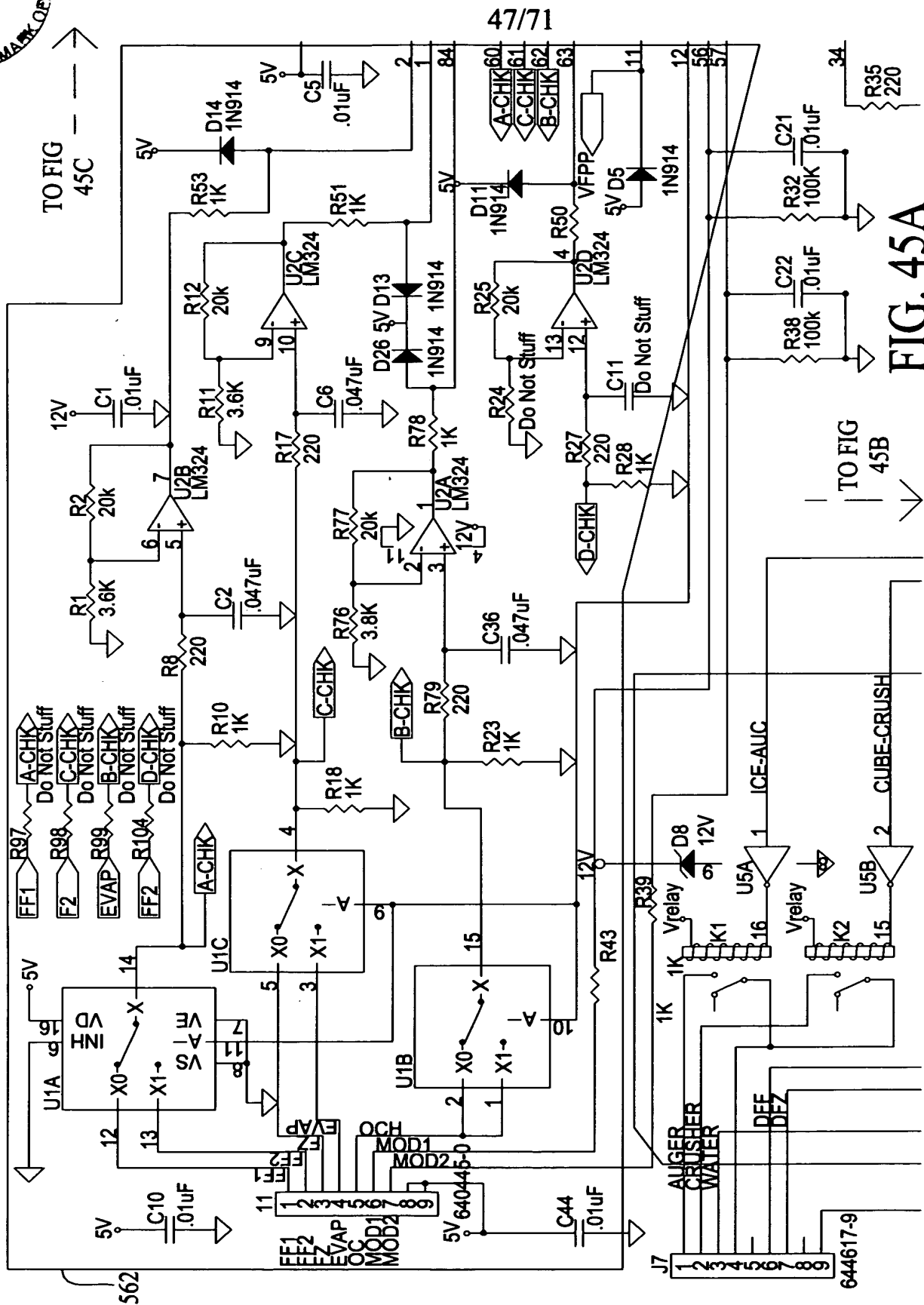


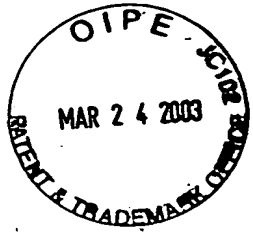


FIG. 45C

FIG. 45C is a detailed schematic diagram of the control system for the damper assembly. The circuit includes a microcontroller (U4, 93C56) interfaced with a motor driver (U6, BA6287F) and a fan driver (U15, BA6287F). The microcontroller is connected to a 5V supply (544) and a 500MHz oscillator (564). It controls the fan driver via a 12V supply (546) and a 12V supply (548). The motor driver controls the motor (542) via a 12V supply (548) and a 12V supply (546). The fan driver controls the fan (542) via a 12V supply (548) and a 12V supply (546). The circuit also includes a 5V supply (544) and a 12V supply (546).

TO FIG
45D

TO FIG
_ 45A



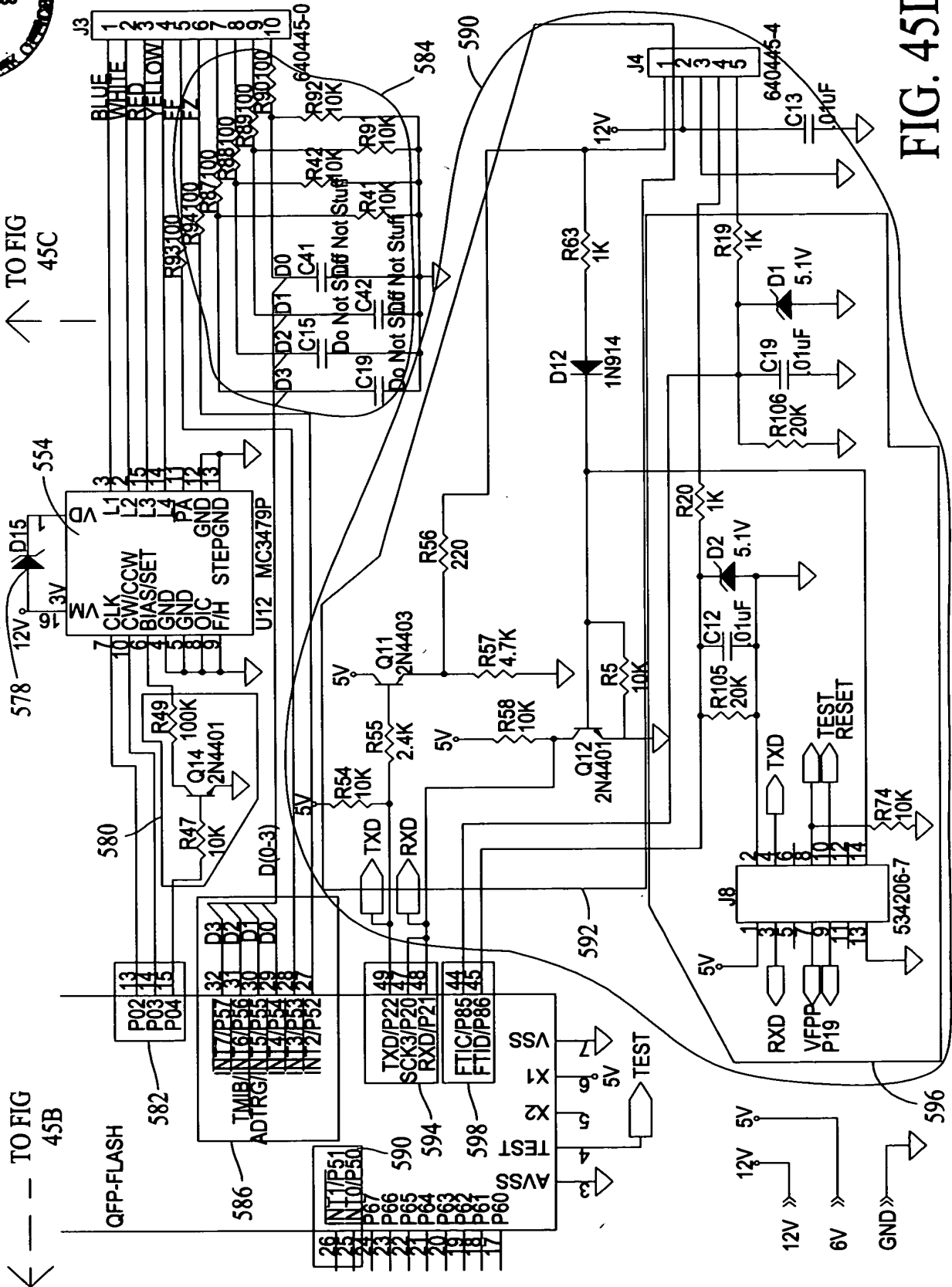
DESIGNED BY	O.G. FIG.
DRAWN BY	CLASS/SUBC.
CHECKED BY	TRAFFSMAN

TO FIG 45C

TO FIG 45B

50/71

FIG. 45D



51/71

APPROVED	O.G. FIG.
BY	CLASS/SUBCL.
DRAFTSMAN	

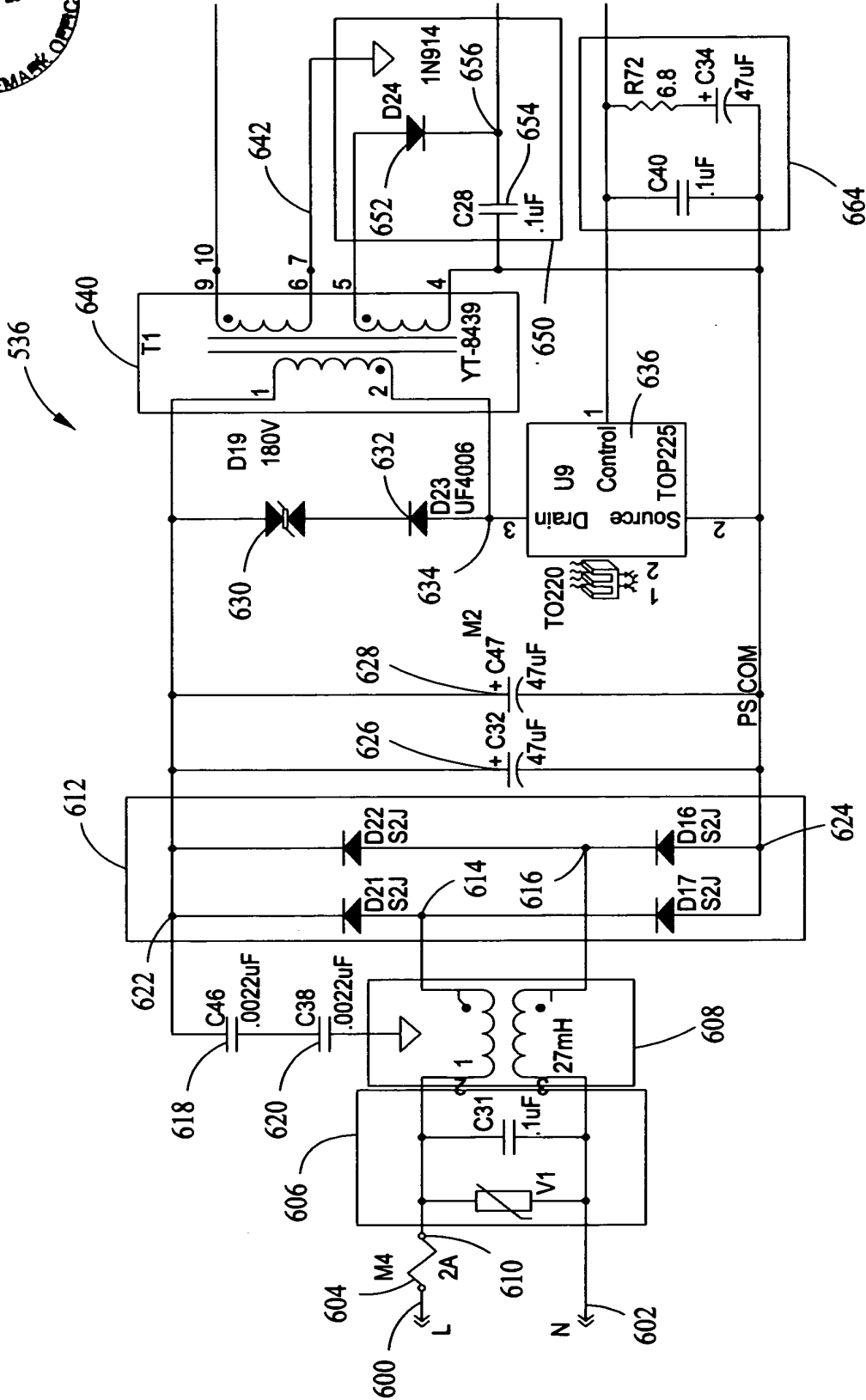
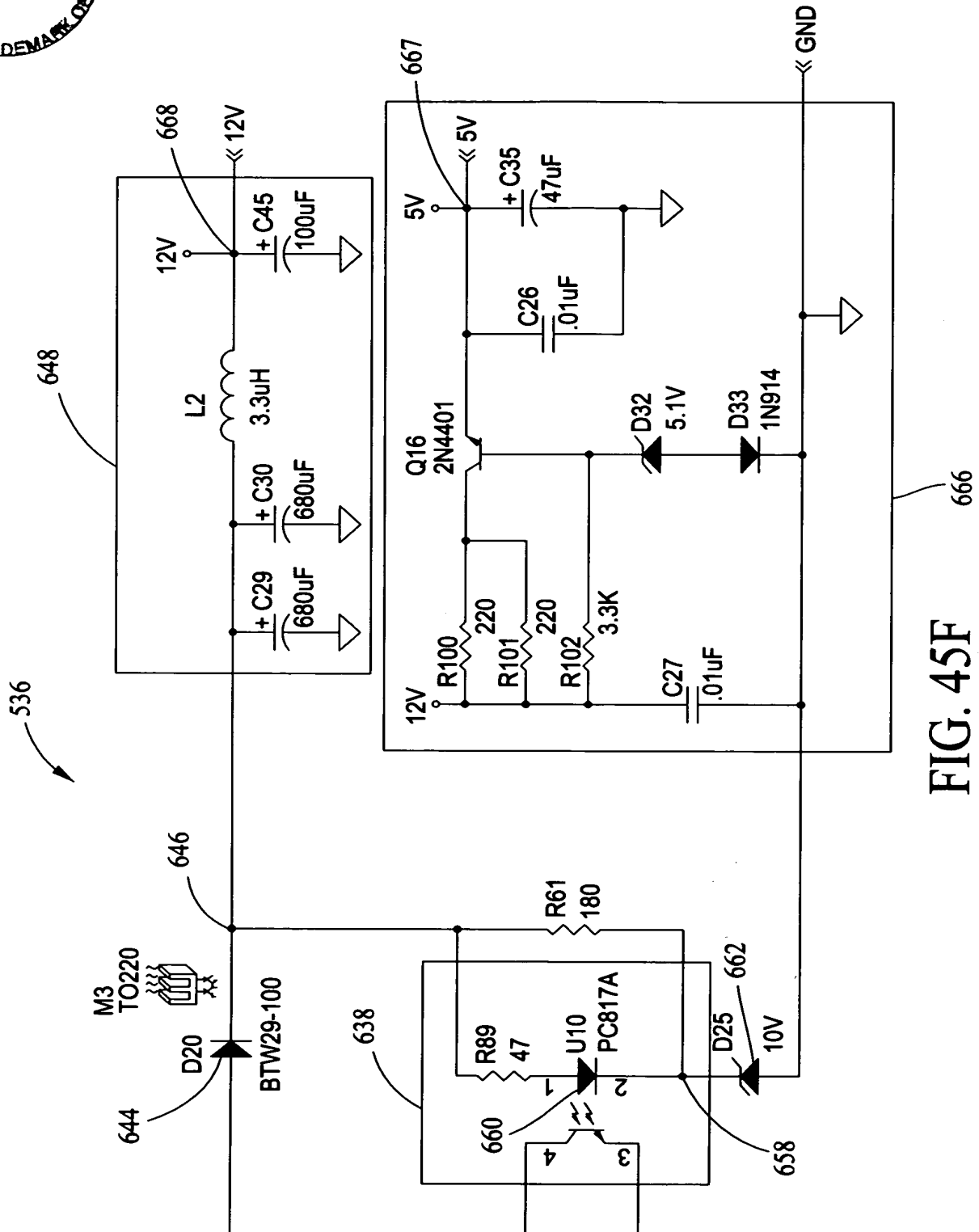


FIG. 45E

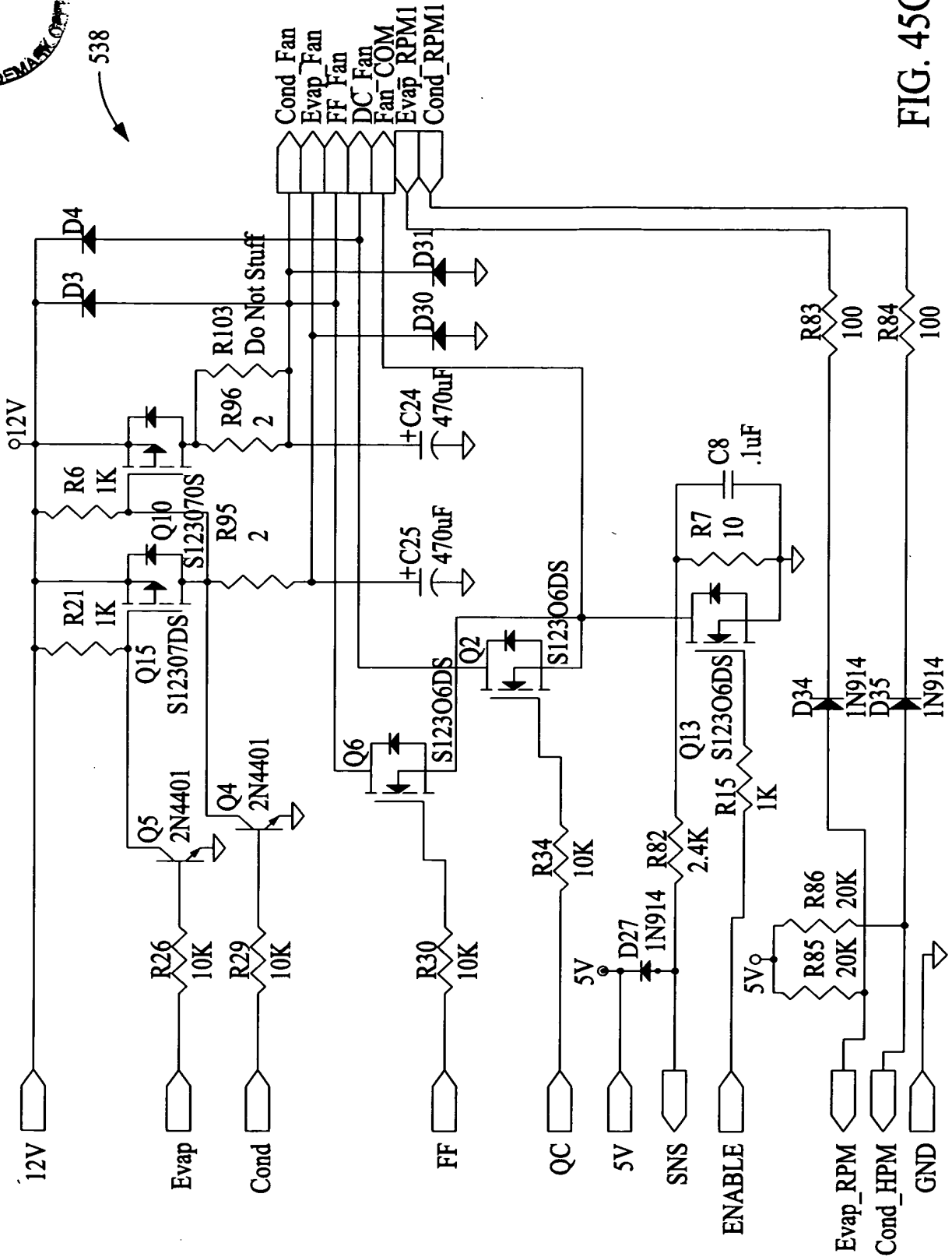


52/71



53/71

FIG. 45G

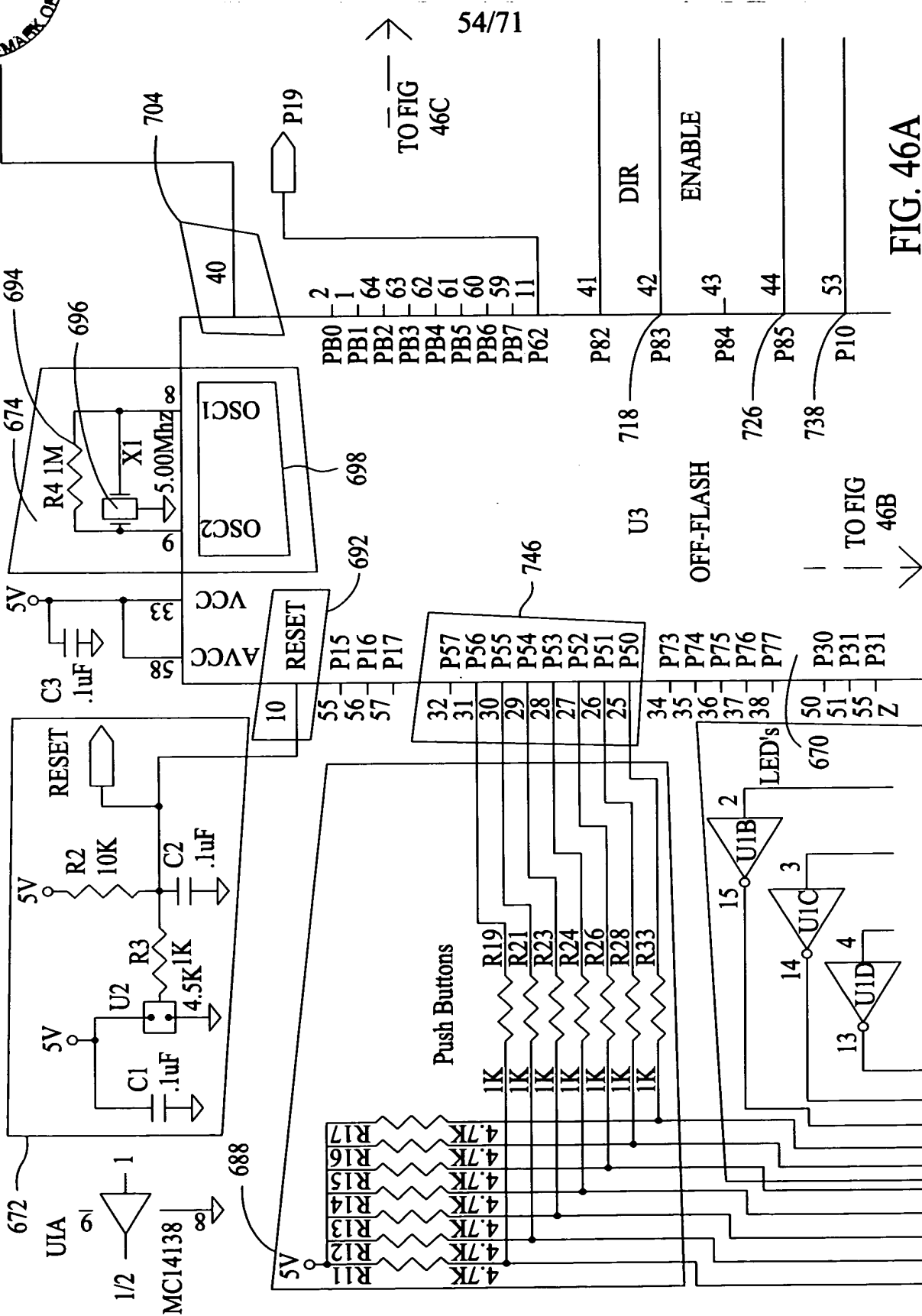


APPROVED O.G. FIG.
 BY CLASS/SUBCL.
 DRAFTSMAN





APPROVED BY CLASS SUBCL. DRAFTSMAN

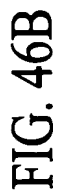


54/71

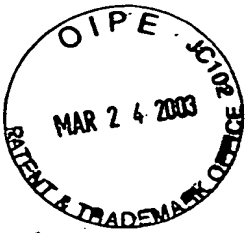
TO FIG 46C

TO FIG 46B

FIG. 46A



TO FIG
46B



APPROVED	O.G. FIG.
BY	CLASS SUBCL
RAFTSMAN	

TO FIG
47C

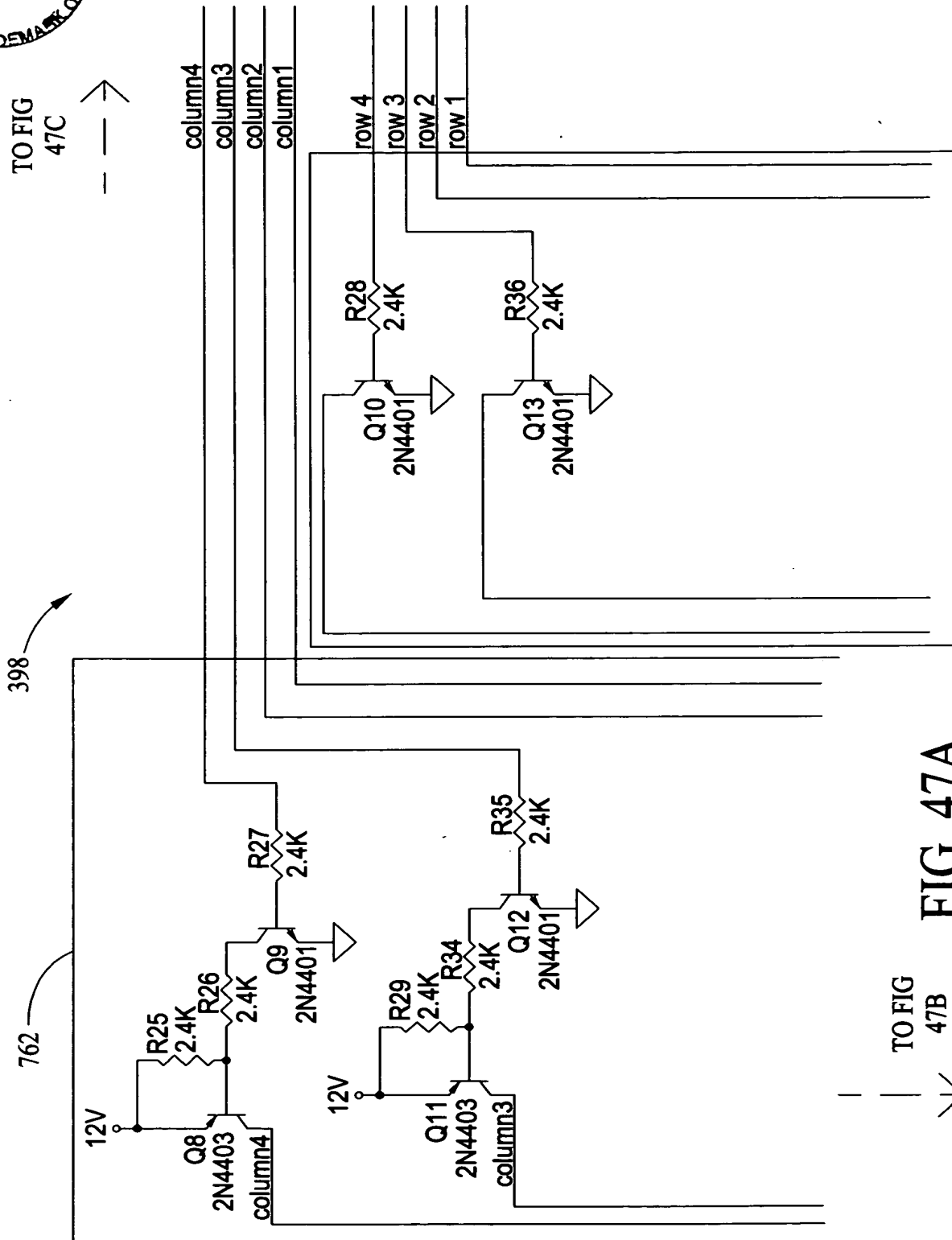


FIG. 47A

TO FIG
47B

59/71



DESIGNED BY	CLASSIFIED	FIG. NO.
BY	CLASS	SUBCL.
DRAFTSMAN		

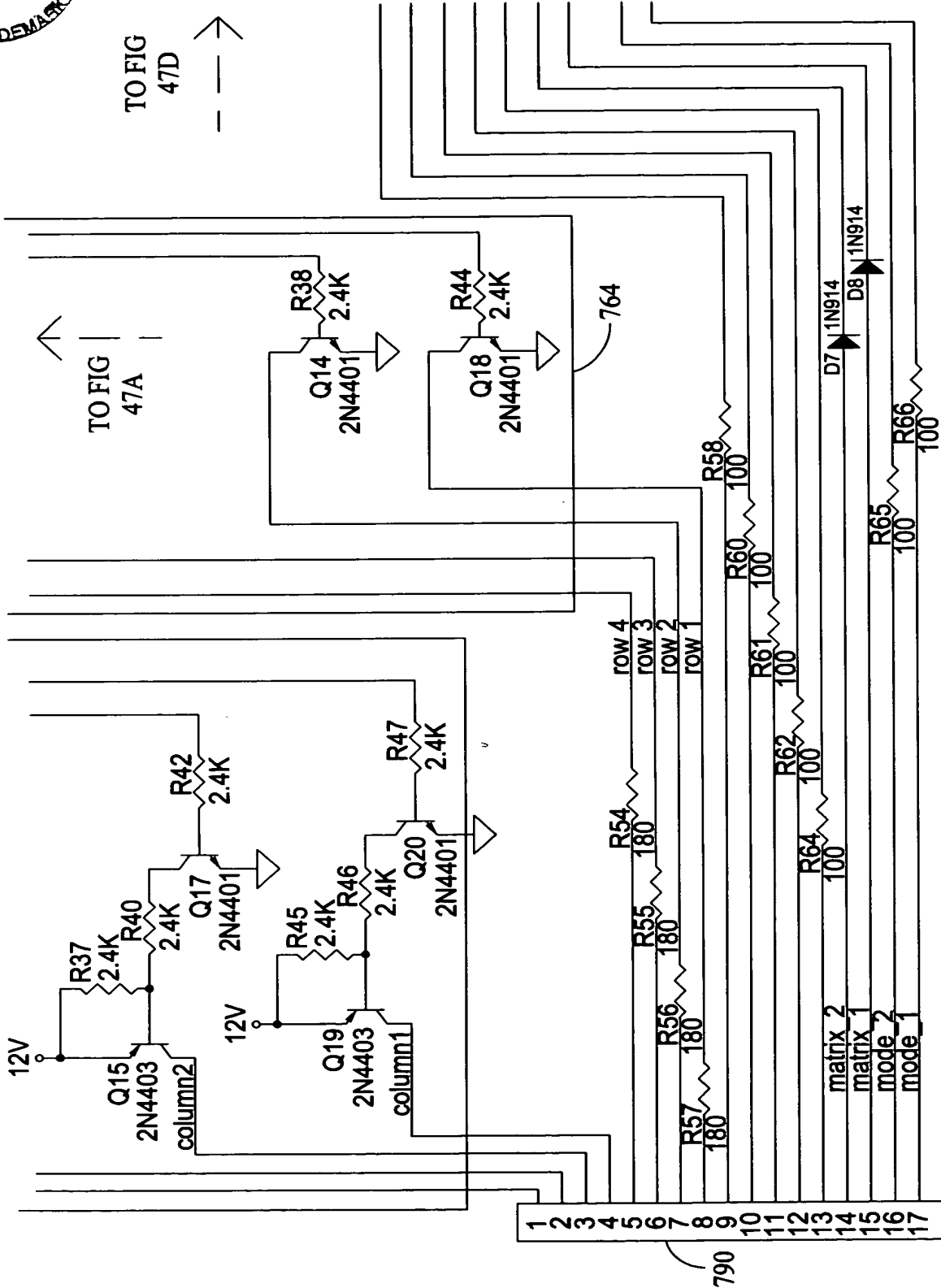


FIG. 47B



60/71

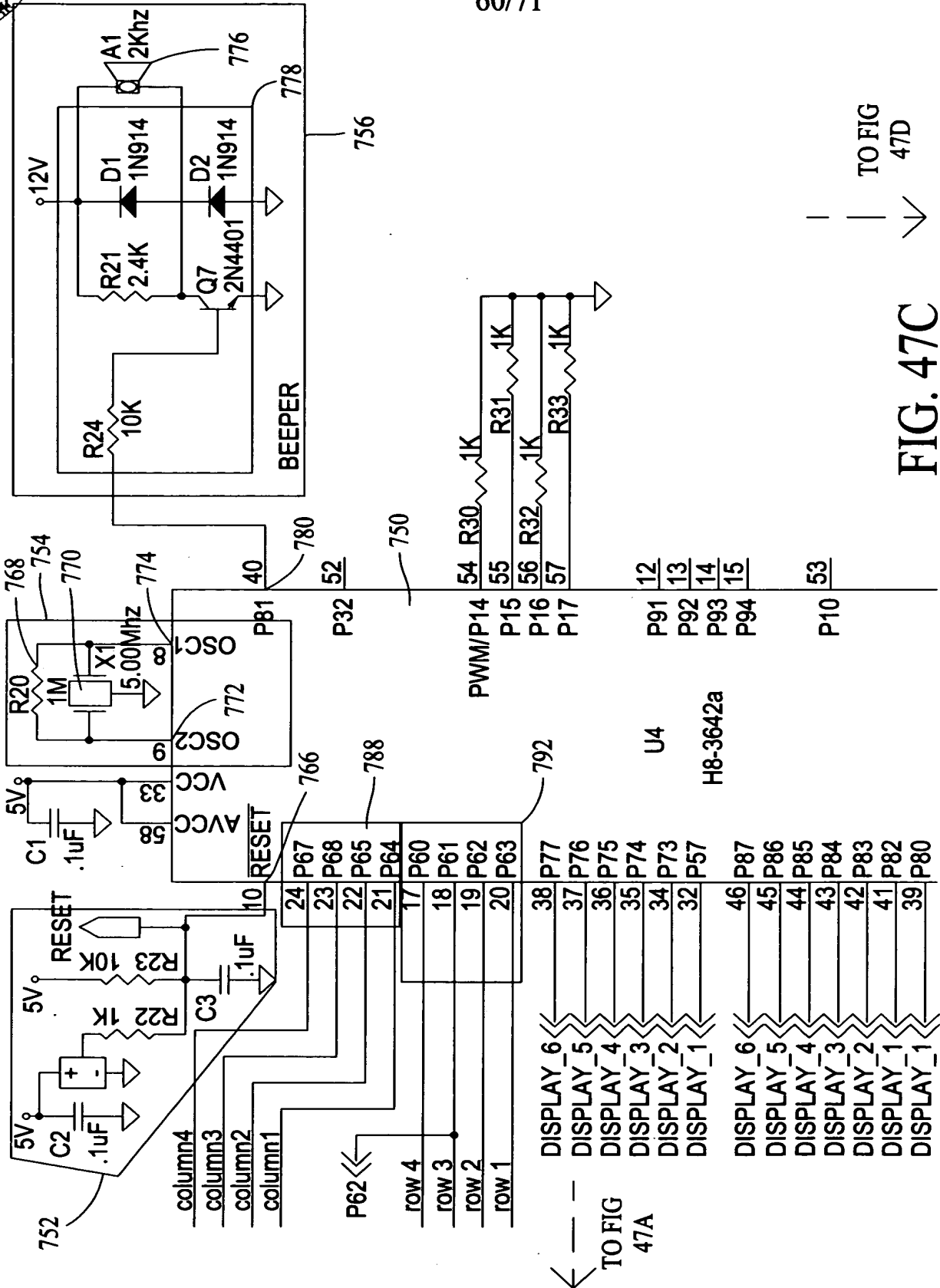


FIG. 47C

TO FIG 47D

TO FIG 47A



760

APPROVED	O. G. FIG.
BY	CLASS/SUBCL.
INVENTOR	BY
W. RAFTSMAN	

62/71

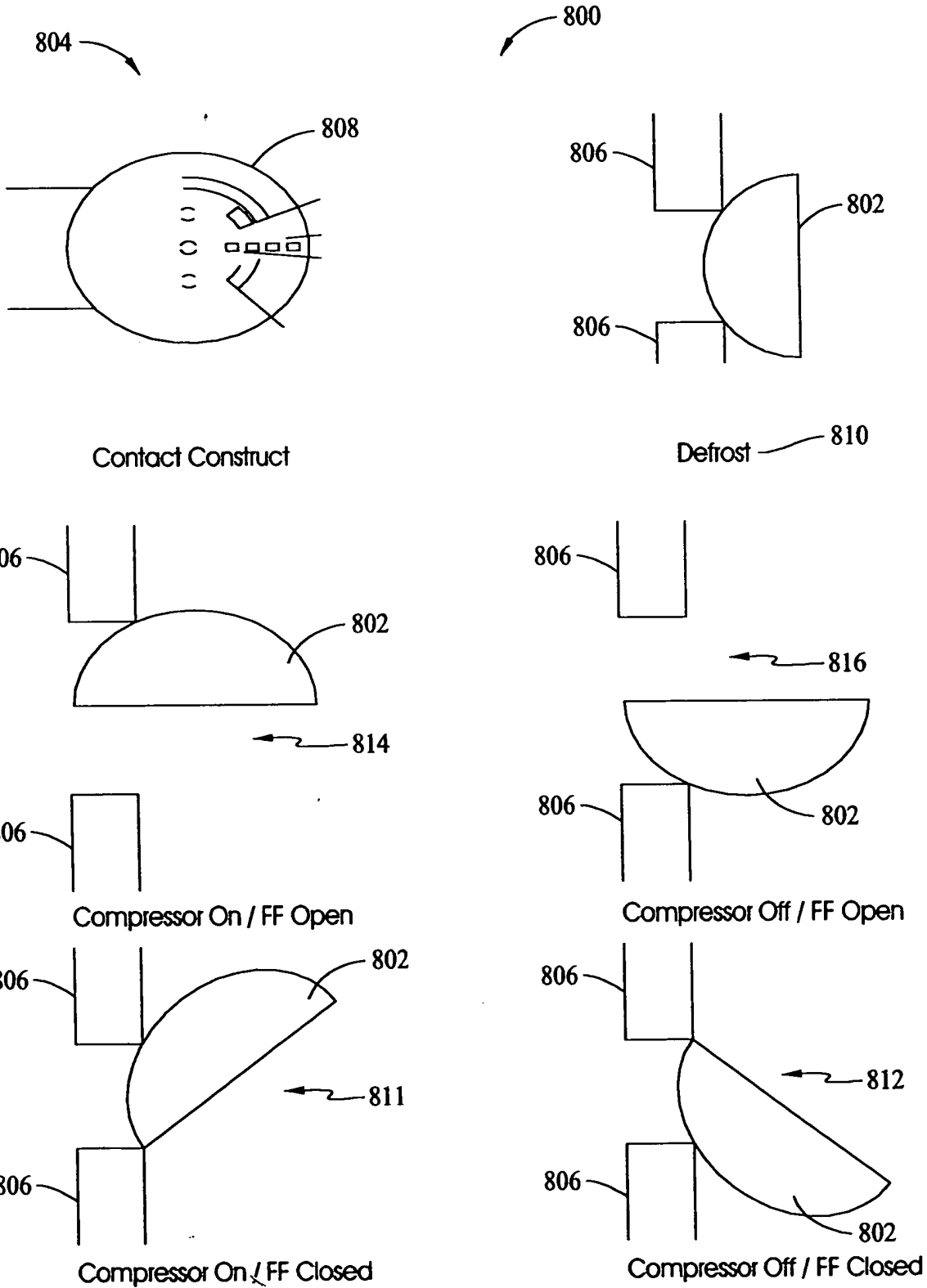


FIG. 48

FIG. 49

APPROVED	D.G. FIG.
BY	CLASS/SUBCL.
RAFTSMAN	

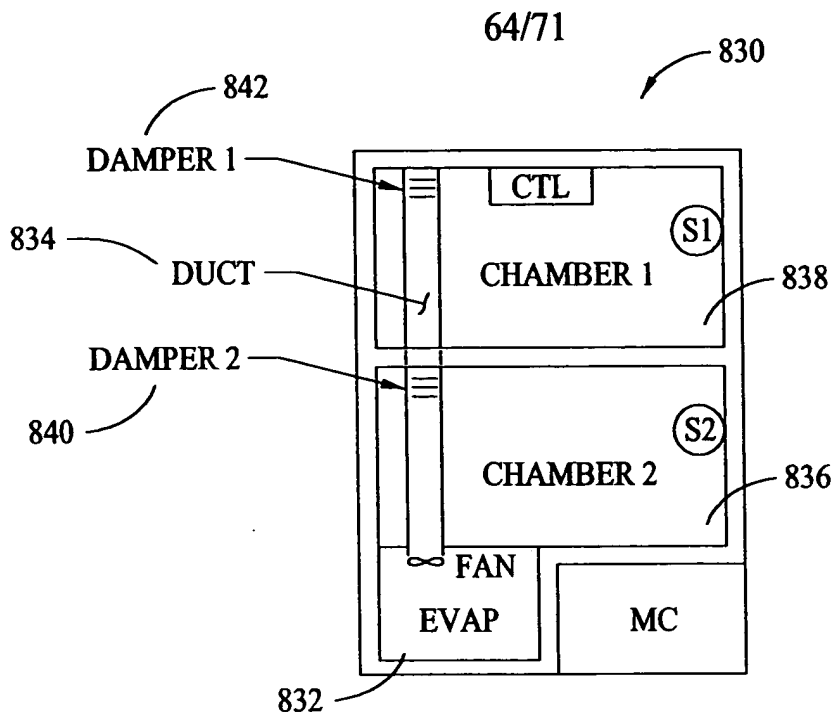


FIG. 50

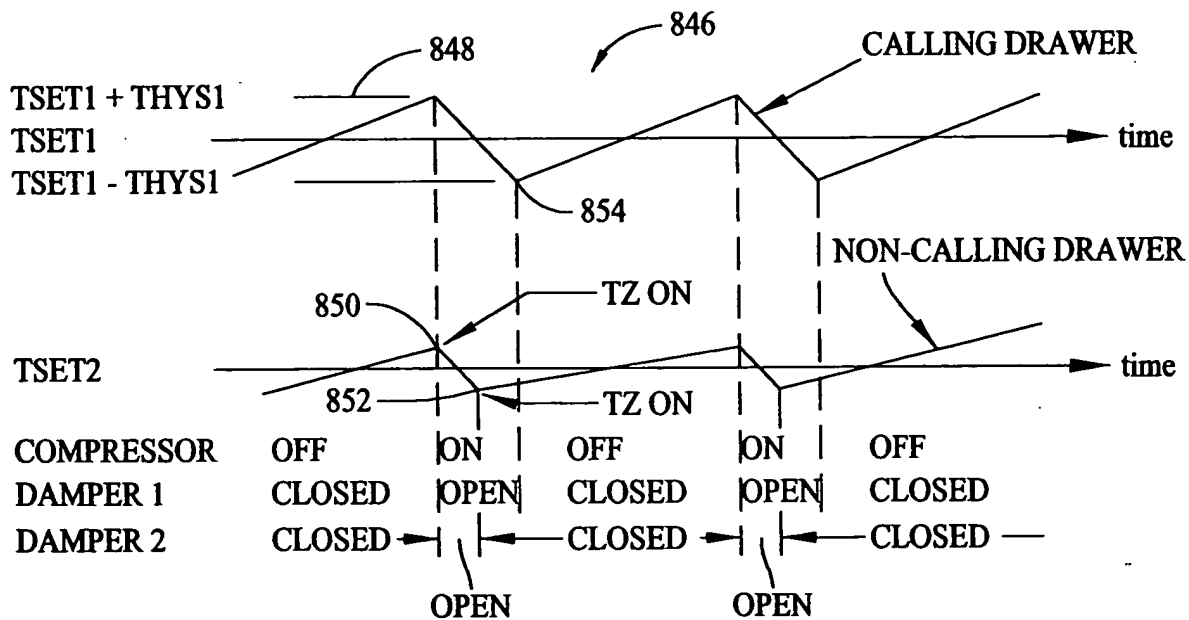
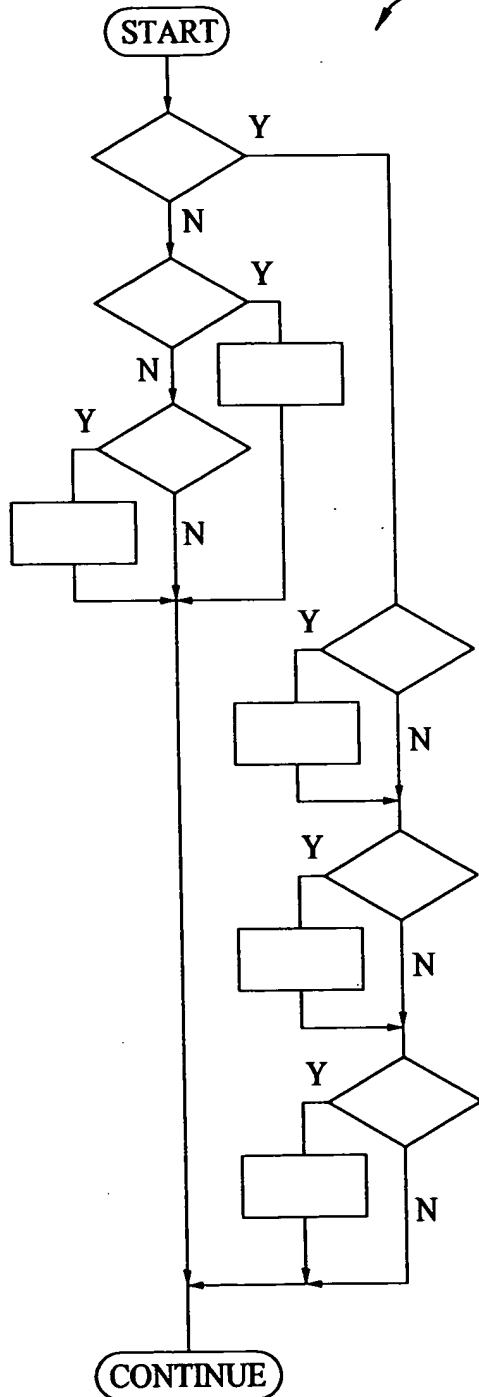


FIG. 51

848

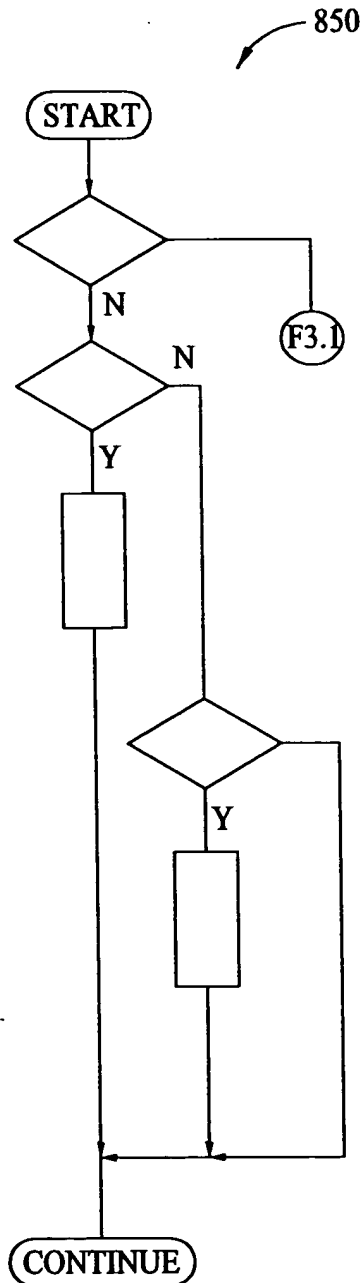


TURN OFF COMPRESSOR & FANS

FIG. 52

DESIGNED BY	O.G. FIG.
CHECKED BY	CLASS
DRAWN BY	SUBCL.
DATE	
DRAFTSMAN	

66/71



COMPRESSOR ON?

$T1 \geq T1 \text{ MAX}$

SET DAMPER FOR EQUAL AIR FLOW
 TURN COMPRESSOR AND FANS ON
 SET CONDITION 1 FLAG
 SET T2 ON = T2 MAX

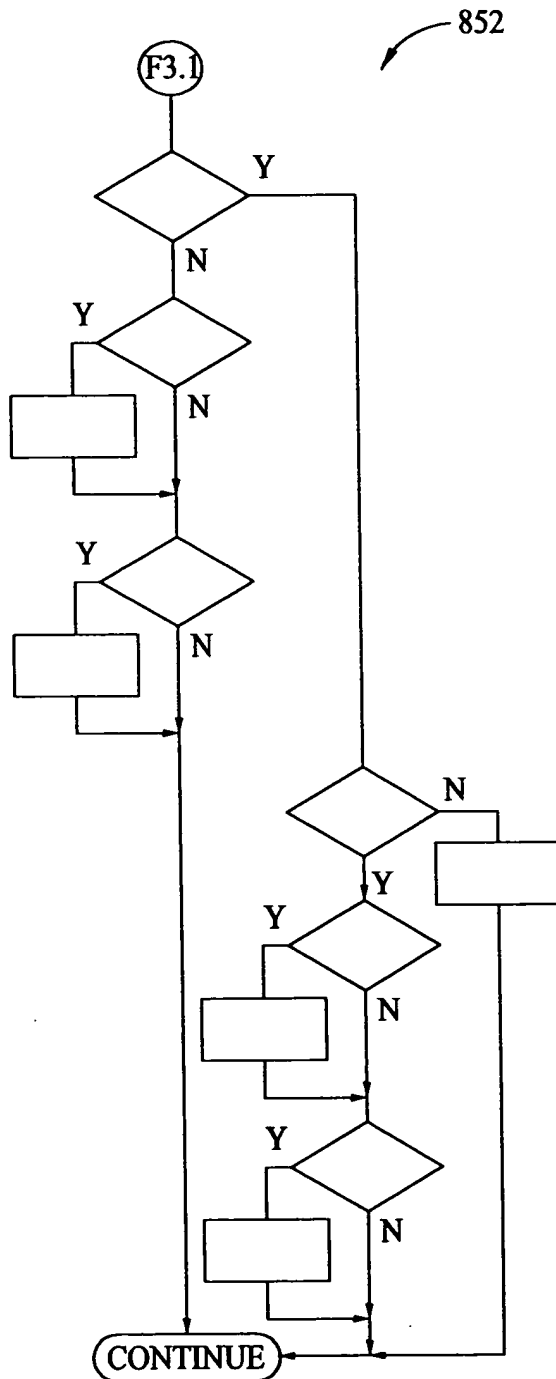
$T2 \geq T2 \text{ MAX}$

SET DAMPER TO MAX AIR FLOW
 TURN COMPRESSOR AND FANS ON
 SET CONDITION 2 FLAG
 SET T1 ON = T1

FIG. 53

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67/71



CONDITION 1 FLAG SET?

T2 ≤ T2 SET - (T2 ON - T2 SET)?

CLOSE DAMPER

T1 ≤ T1 MIN?

TURN COMPRESSOR AND FANS OFF
RESET CONDITION 1 FLAG

CONDITION 2 FLAG SET?

ERROR - RESTART COMPUTER

T2 ≤ T2 MIN?

CLOSE DAMPER

T1 ≤ T1 SET - (T1 ON - T1 SET)?

**TURN COMPRESSOR AND FANS OFF
RESET CONDITION 2 FLAG**

FIG. 54

DESIGNED	O.G. FIG.
BY	CLASS SUBCL.
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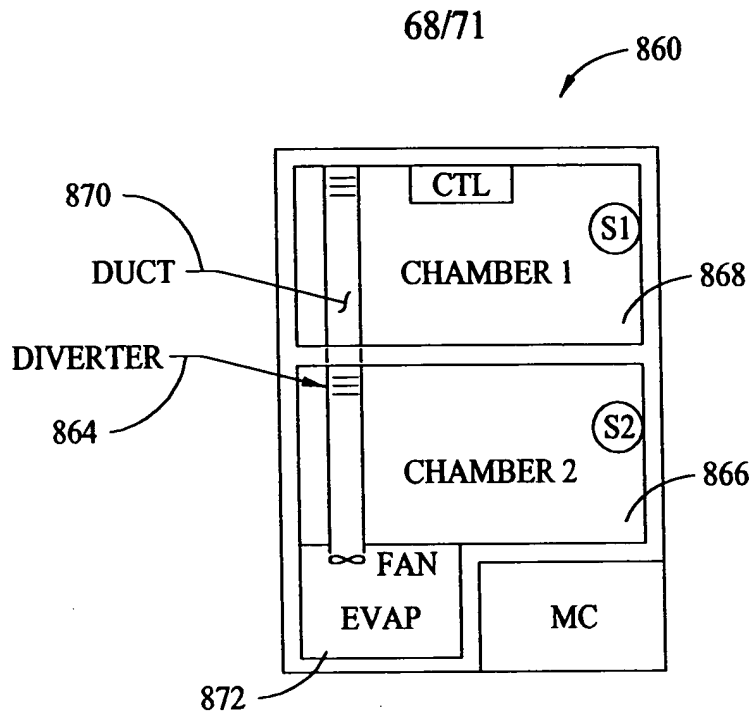


FIG. 55

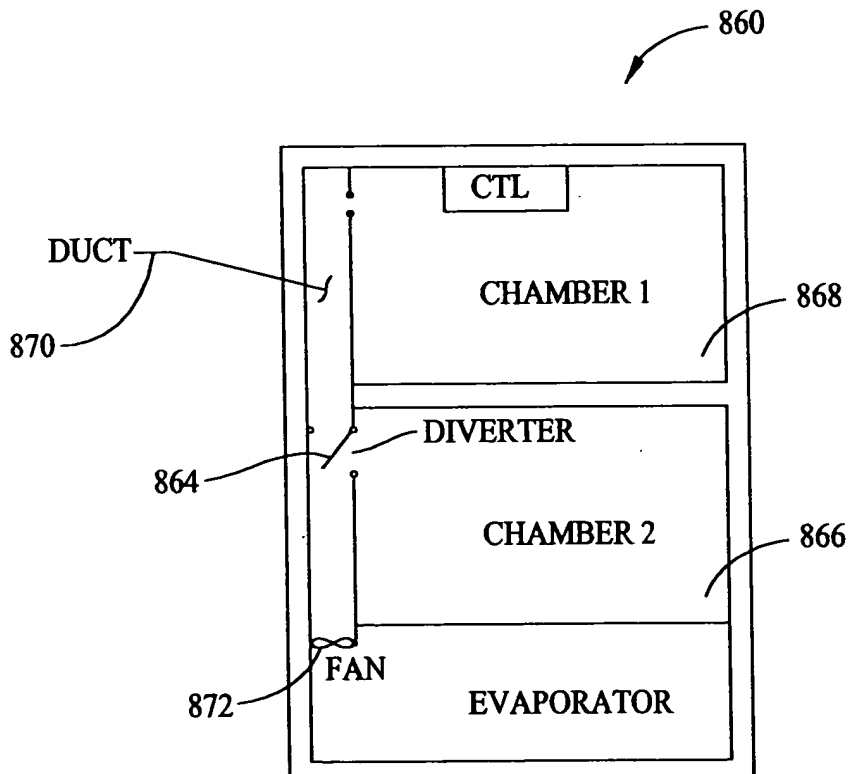
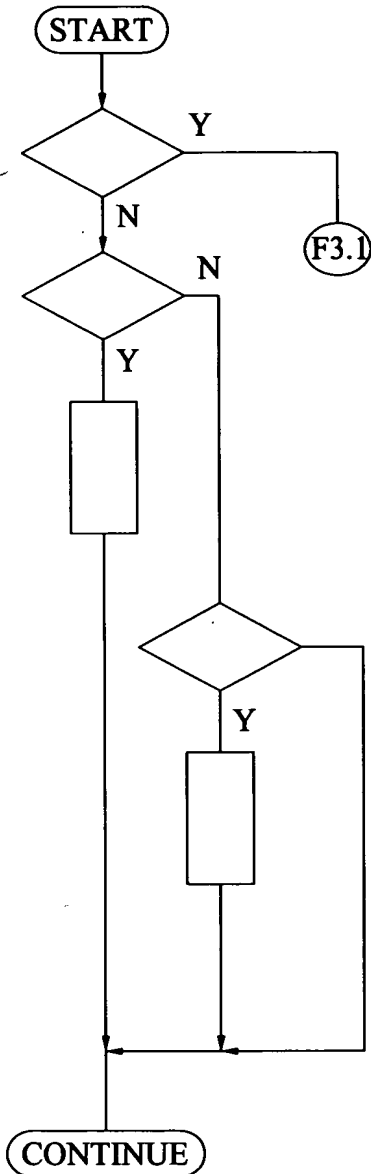


FIG. 56

69/71



Q.G. FIG.	CLASS SUBCL.
APPROVED BY	CRAFTSMAN



COMPRESSOR ON?

$T1 \geq T1 \text{ MAX}$

SET DIVERTER FOR EQUAL AIR FLOW
 TURN COMPRESSOR AND FANS ON
 SET CONDITION 1 FLAG
 SET T2 ON = T2

$T2 \geq T2 \text{ MAX}$

SET DIVERTER FOR EQUAL AIR FLOW
 TURN COMPRESSOR AND FANS ON
 SET CONDITION 2 FLAG
 SET T1 ON = T1

FIG. 57

70/71



APPROVED	O.G. FIG.
BY	CLASS SUBC.
DRAFTSMAN	

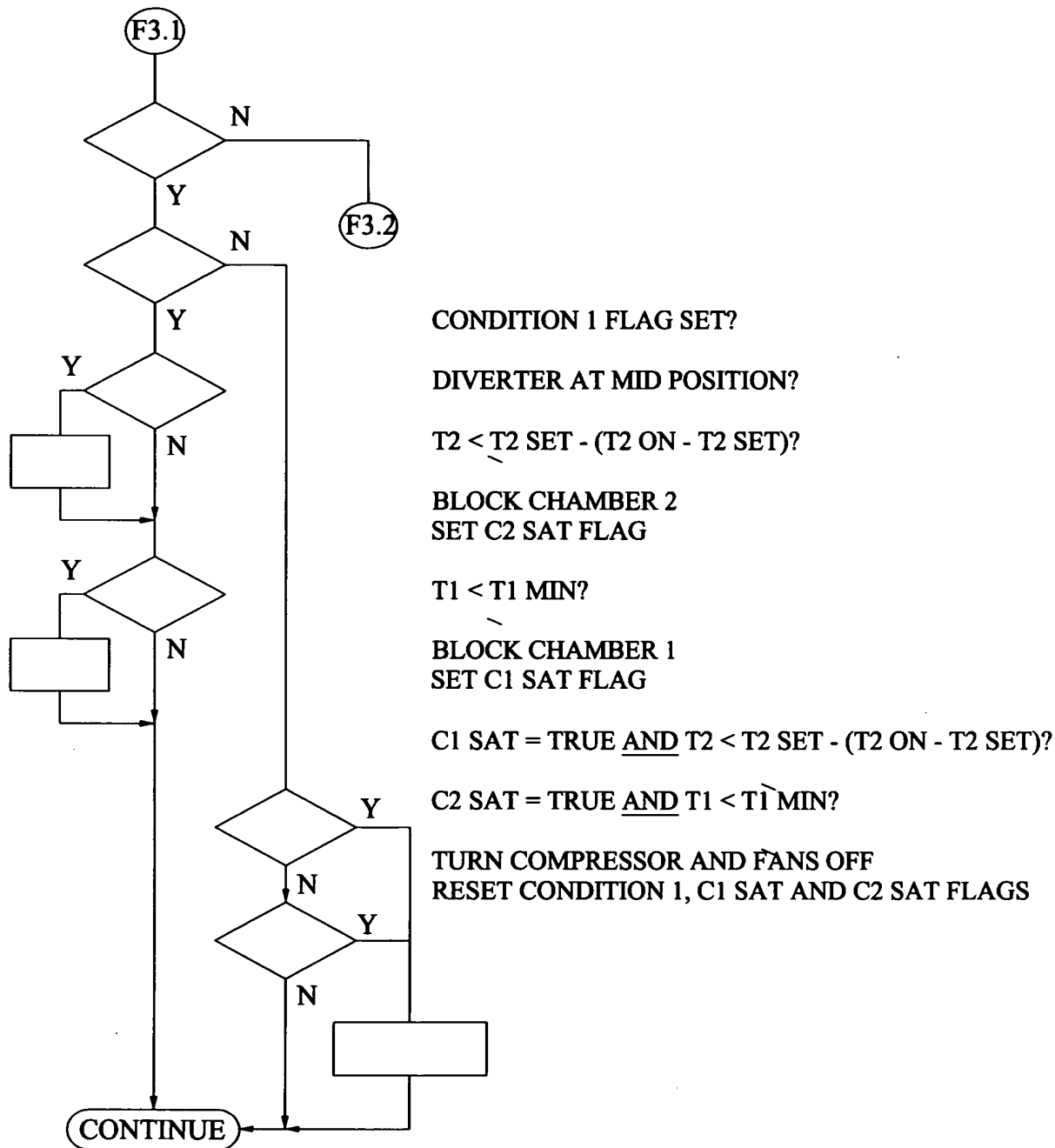


FIG. 58

APPROVED	O. G. FIG.
BY	CLASS/SUBCL.
CRAFTSMAN	

